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NINTH WORLD'S POULTRY CONGRESS

Paris, France, August 2-9, 1951

MESSAGES OF WELCOME

VINCENT AURIOL, President of the French Republic

"France is happy to welcome the World's Poultry Congress whose works have not only a high scientific and practical import but tend to bring together men, imbued with the same ideal of pacific work."

PIERRE PFLIMLIN, Minister of Agriculture

"I hope that many delegates from foreign nations interested in poultry problems, will reply to the invitation of the French Organization Committee, which, I feel sure, will do everything to assure the success of this great manifestation."

ROBERT SCHUMAN, Foreign Office Minister

"I wish the 9th World's Poultry Congress to be a success for France and a token of peaceful cooperation between nations."

ALEX WILTZER, President of the Ninth World's Poultry Congress

"France is preparing a hearty welcome to all those from other countries who intend to be present at the Congress.

The Organizing Committee will do its utmost to ensure that this Congress achieves the splendour and the greatness of previous Congresses.

Apart from the presence of all countries where Poultry Breeding flourishes, French poultry keepers will participate in full to the success of this great Congress and of the World Exhibition.

Paris, and our large provincial towns and regions to be visited during the course of the excursions and tours which are being arranged, will extend a very hearty welcome to all Congress Members.

Evening entertainments and receptions are being arranged to provide facilities for members from other countries to meet French poultry keepers in pleasant and congenial surroundings.

We hope this Congress may be a source of inspiration and a further step forward in the development of the science and progress of poultry husbandry. We hope, too, that this Congress, representative of so many nations, will help, in some measure, to contribute to the attain-

ment of international peace and understanding, so much desired by France, and in this way ensure the well-being of mankind.

Members of Congress, it is with these ideals in mind that the French Poultry Industry extends the heartiest of welcomes."

W. D. TERMOHLEN, President of the World's Poultry Science Association

"On behalf of The World's Poultry Science Association, which is the only international organization representative of all elements interested in the Poultry Industry, it gives me great pleasure to invite the poultry people of the various nations of the world to attend and participate in the Ninth World's Poultry Congress.

After attending a recent series of meetings in Paris with members of the French Organization Committee for the Ninth World's Poultry Congress, I am pleased to announce that the plans developed assure a noteworthy and highly successful Congress.

PALAIS OF CHAILLOT

Place du Trocadero—Paris

Since the first Congress in The Hague, Netherlands, in 1921, the World's Poultry Congress has come to be considered as an outstanding example of how persons from all parts of the world who are contributing to the advancement of the various branches of the Poultry Industry meet together to exchange knowledge and experience regarding this great world-wide industry.

The Poultry Industry has made remarkable growth and progress in the last 50 years. During the years ahead we can continue this growth and progress only by increased attention to education, research, and organization. The Ninth World's Poultry Congress provides the opportunity for developing an understanding among the poultrymen of the world on how they can forge ahead in the future.

Membership in the Congress is open to all who desire to participate, whether engaged in producing, breeding, hatching, marketing, teaching, research, observation, investigation, experiments, demonstration, organization, or any other constructive activity of the Poultry Industry. I hope to see every person who is truly interested in the future of the industry, in Paris August 2-9, 1951."

HONORARY COMMITTEE

M. Vincent Auriol	*President of the Republic*
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AIMS AND OBJECTS

The following are the aims and objects of the Ninth World's Poultry Congress and the International Exhibition of Poultry:

1. To stimulate interest in world poultry affairs and to promote friendly international relations by bringing together those interested in the various phases of the poultry industry from all parts of the world;

2. To pool the best and most recent knowledge concerning the various aspects of the poultry industry in all parts of the world;

3. To demonstrate the benefits of the application of scientific developments in all branches of poultry husbandry, to inten-

sify the fight against disease in poultry and help in the improvement of the economic position of poultry keepers;

4. To encourage the development of scientific research work and education in connection with the production and marketing of poultry products;

5. To demonstrate by means of National and International Exhibitions the improvement in the breeding of poultry, rabbits and pigeons;

6. To afford poultry keepers from all parts of the world an opportunity to visit some poultry farms and other units of the industry, places of historical interest and tourist centers.

WORLD'S POULTRY EXHIBITION

The Exhibition includes three sections:

1. All French and Foreign breeds: fowls, guinea fowls, ducks, geese, turkeys, rabbits exhibited by France.

This section will be the object of a special regulation program.

Subjects will be judged according to the rules of the annual international exhibition of Paris organized by the Poultry Central Society of France.

2. All French and Foreign breeds: fowls, guinea-fowls, ducks, geese, turkeys, pigeons, rabbits exhibited by the participating countries, France excluded

Subjects will not be judged.

Therefore, it is a question of presentation.

Subscription fees and the composition of the lots will be the same for both sections mentioned above.

As to the rewards, the formula will be different. Every foreign breeder, presenting a minimum of 3 subjects will receive a bronze medal specially struck for the ninth World's Poultry Congress.

Entries of adults or of young subjects will comprise 1 male and 3 females: fowls, guinea-fowls, ducks, geese, turkeys and rabbits; 2 pairs for the pigeons.

Subscription fee for each group is 300 French francs.

Units will be classified in adults and in young subjects, in males and in females. Subscription fee is 100 French francs by subject. Engagements must reach the Secrétariat Général du Congrès, 3 rue d'Athènes, Paris (9), France, before the 1st of June 1951, either through the channel of the National Committee or direct to the Secretariat General of the Congress, for countries where a National Committee has not been set up.

The settlement of subscriptions must be made beforehand through the channel of the Embassy or the Chargé d'affaires of each country in Paris, not later than the 15th of June 1951.

3. A presentation of materiel, food products, poultry veterinary patents, is open to all Nations. To this effect, manufacturers and veterinary laboratories may dispose of open ground surrounding the Exhibition at 1,000 French francs the square meter.

All stands will measure a minimum of 3 meters depth. No stand of less than 6 square meters, that is 2 meters frontage by 3 meters depth, will be allowed.

At the request of those concerned, the stands may be grouped by Nations.

The ground let, being bare, each exhibitor must put up his stand by his own means or trust its erection to a private enterprise.

Different addresses of enterprises qualified for this sort of work may be obtained at the Secrétariat Général du Congrès.

No sale will be authorized in the stands.

All visitors can get a prospectus or catalogue describing the materiel or the products which are exposed.

These documents may include the publication of conditions and sale prices as well as the address of the firm and eventually of all its agents in France.

The entries as well as the whole amount of the subscription fees must be sent at the Secretary General of the IXth Congress at the same date and in the same condition than those fixed at the end of the second paragraph, above, for the presentation of fowls.

CONGRESS MEMBERSHIP

Membership is of the following types: (1) *Participating member* of Congress—3500 French Francs. Entitles the holder to participate in the Congress activities and to receive the Congress reports. (*World's Poultry Science Association members are entitled to a reduction of 20%*). (2) *Wife or relatives* of the Congress member—1750 French Francs. Entitles the holder to the same privileges as (1) but will not receive the Congress reports. (3) *Absentee member*—1750 French Francs —will receive the Congress reports and other printed matter.

INFORMATION

Information concerning Congress plans and details may be obtained by writing to the following: Mr. Alex Wiltzer, President, Ninth World's Poultry Congress, 28 Rue Bonaparte, Paris 6, France or Mr. P. Waroquiez, Secretary-General, Ninth World's Poultry Congress, 12 Rue d'Armaille, Paris 17, France.

THE EFFECT OF CREEPING INDIGO (*INDIGOFERA ENDECAPHYLLA*) ON LAYING CHICKENS*

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College of Agriculture, University of Hawaii

Creeping indigo (*Indigofera endecaphylla* Jacq.) grows well in the Hawaiian Islands. However, Nordfeldt and Younge (1949) have reported that this legume may be harmful to pregnant dairy cattle under certain conditions and suggested that until more information was procured, breeding stock be maintained on forage free, or containing only small amounts, of creeping indigo. Since the effect of creeping indigo on the domestic fowl was not known, and to procure additional information on this phenomenon, a series of feeding trials were conducted both on growing chicks and on laying hens. It was reported by Rosenberg and Palafox (1950) that both creeping indigo meal and leaf meal induced a somewhat superior growth rate in chicks when fed at 1.25 percent of the diet, and there was no real difference in growth rate when 2.5 percent was compared with a standard starter ration. Both meals significantly depressed growth of chicks when fed at levels of 5 percent or more of total ration. Although toxicity of the meals was highly variable between trials, a syndrome that physically resembled Newcastle disease was induced as early as 7 days. The effects of this legume on egg production, hatchability, and feed consumption, as well as the effects of the toxic principle transmitted through the egg on subsequent livability and growth of chicks, are presented in this paper.

MATERIALS AND METHODS

In trial 1, 40 New Hampshire pullets were randomized into four groups after they had been in production a minimum of 2 weeks. They were fed ration 1 for 4 weeks to determine if there were significant differences due to randomization among the groups for egg production, hatchability, and feed consumption. During the fifth and sixth weeks, rations 2, 3, and 4 were gradually substituted in groups 2, 3, and 4, respectively. The experimental rations shown in Table I were then fed for 24 weeks. Egg production was summarized weekly on a hen-day basis; feed consumption was measured biweekly; and hatchability was determined by setting a 7-day collection every 14 days. After the groups were on the experi-

*Published with the approval of the Director of the Hawaii Agricultural Experiment Station as Technical Paper No. 211.

TABLE I

Composition of Rations Utilized in Trials 1 and 2

Ingredients	Ration Numbers				
	1	2	3	4	5
Ground yellow corn, lb.	30.0	30.0	30.0	30.0	30.0
Ground wheat, lb.	30.0	30.0	30.0	30.0	30.0
Ground oats, lb.	20.0	20.0	20.0	20.0	20.0
Herring meal, lb.	5.5	5.5	5.5	5.5	5.5
Soybean oil meal, lb.	9.0	9.0	9.0	9.0	9.0
Alfalfa meal, lb.	5.0	3.75	2.5	—	—
Salt, lb.	0.5	0.5	0.5	0.5	0.5
Manganese sulfate, gm.	2.5	2.5	2.5	2.5	2.5
Delsterol (Dry D) (2,000 A.O.A.C./gm.), gm.	25.0	25.0	25.0	25.0	25.0
Riboflavin, mg.	35.0	35.0	35.0	35.0	35.0
Creeping indigo leaf meal*, lb.	—	1.25	2.5	5.0	0.0
Creeping indigo meal*, lb.	—	—	—	—	5.0

* Creeping indigo meal and leaf meal dehydrated at 100°C.

mental diets for 2 weeks all chicks that subsequently hatched were reared to 14 days of age and fed the same chick starter ration. Data were collected on livability as well as on growth rate to determine whether there was any maternal transmission of a toxic principle through the hatching egg.

In trial 2, 32 pullets that had been reared to sexual maturity on 0 and 5 percent creeping indigo meal were fed rations 1 and 5, respectively, from date of first egg through 11 weeks of egg production. Eggs were set weekly in the incubator during the last 4 weeks of this trial to procure additional data on hatchability.

RESULTS

The data procured in trial 1 on the effect of creeping indigo meal on egg production are shown in Figue 1. There was no significant difference between the four groups during the 4-week pretest, as well as during the 2-week interim period. Following the introduction of the experimental diets, however, a change in the rate of lay was soon apparent. Egg production of the group fed 5 percent creeping indigo leaf meal dropped steadily and stopped completely within 8 weeks. The group fed 2.5 percent creeping indigo leaf meal did not respond as readily, but its production was also adversely affected. The group fed 1.25 percent leaf meal was least affected. The differences in egg production between groups were highly significant; during the 24-week period on the experimental rations group 1 averaged 68.7 percent, while groups 2, 3, and 4 averaged, respectively, 60.2, 37.5, and 7.5 percent production.

The inclusion of creeping indigo leaf meal in the diet of laying birds also depressed feed consumption. Whereas there was no real difference between the groups during the pretest period, there was a highly significant difference during the test period. By the conclusion of the 24-week trial, the control birds had consumed, on the average, 55.9 pounds of feed whereas the groups fed 1.25, 2.5, and 5.0 percent creeping indigo leaf meal averaged 44.6, 41.6, and 24.9 pounds, respectively.

Body weight was adversely affected by creeping indigo leaf meal. As may be seen in Figure 1, the magnitude of the effect appeared to vary in accordance with the concentration of the meals. The group fed ration 2 continued to grow but the birds did not grow as rapidly as the controls. The groups fed rations 3 and 4 lost weight. At the end of the experiment the birds in groups 1, 2, 3, and 4 averaged 5.70, 5.32, 4.58, and 3.77 pounds, respectively. The difference in body weights among the groups was highly significant.

The data on the effect of creeping indigo leaf meal on hatchability are shown in Table II. It was not possible to pro-

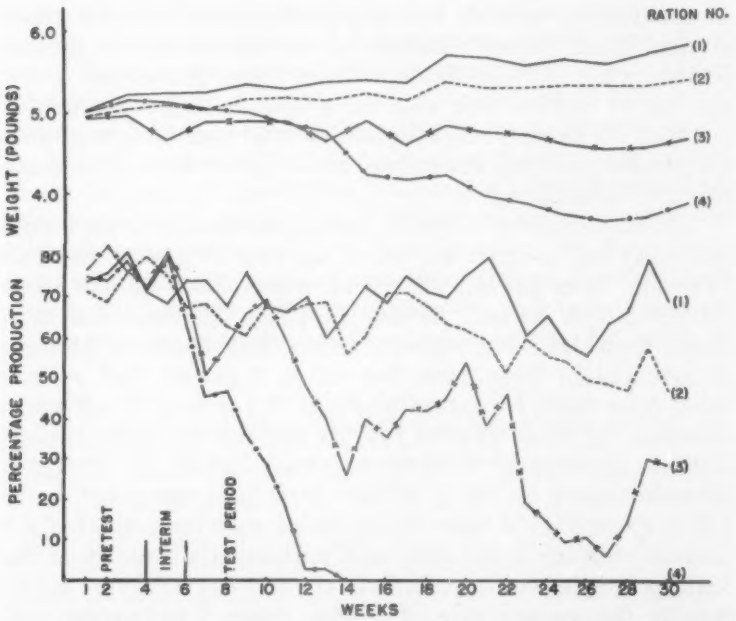

Fig. 1. Effect of Creeping Indigo Leaf Meal on Body Weight and Egg Production.

TABLE II

Effect of Creeping Indigo Leaf Meal on Hatchability

Duration of study (weeks)	Weeks on Creeping Indigo Leaf Meal	Percentage Hatchability			
		Ration 1	Ration 2	Ration 3	Ration 4
2	Pretest	92.3	88.0	77.9	97.1
4	period*	82.4	84.8	100.0	85.0
6	Interim	94.6	86.8	94.3	93.8
8		85.0	73.7	91.7	87.5
10		80.6	100.0	94.4	83.3
12		89.5	90.5	75.0	75.0
14	On	90.5	65.6	47.1	100.0†
16	creeping	85.7	88.9	92.3	no eggs
18	indigo	88.4	88.6	94.1	no eggs
20	leaf	82.8	82.6	83.3	no eggs
22	meals†	86.7	100.0	92.3	no eggs
24		87.5	88.9	100.0	no eggs
26		88.2	83.3	100.0	no eggs
28		89.3	75.0	100.0	no eggs
30		80.0	90.0	71.4	no eggs

* Between rations 1, 2, and 3 $F = 0.0467$ $P > 0.05$
† Between rations 1, 2, and 3 $F = 0.0416$ $P > 0.05$
‡ Single egg

cure an adequate sample on hatchability for group 4 because of the rapid drop and complete cessation of egg production. An analysis of variance was conducted, however, on the other groups. The F values obtained for the test as well as pretest periods were not significant. The average percentage hatch for the 12 hatches was 86.2 for group 1, 85.6 for group 2, and 86.8 for group 3. Insofar as this trial may be interpreted, 2.5 percent creeping indigo leaf meal did not have an adverse effect on hatchability.

It was observed in this investigation that creeping indigo leaf meal fed to dams will affect the rate of growth of their offspring, even though all chicks were placed on the same starter ration. As may be seen in Table III, the chicks produced from dams fed ration 1 gained 80.3 grams to 14 days of age; chicks from dams fed ration 2 gained 78.6 grams; those from dams fed ration 3 gained 71.1 grams. The F value obtained for chick growth rate as affected by dams' rations was not significant; however, the least significant difference between means at the 5 percent level was calculated to be 7.743. From this, it may be concluded that for dams fed 2.5 percent creeping indigo leaf meal an adequate quantity of the toxic principle was transmitted via the egg to affect significantly the growth rate of chicks. When 1.25 percent was included in the dam's ration, there was not a significant depression in growth rate.

TABLE III

Effect of Creeping Indigo Leaf Meal in Dams' Rations On Growth of Chicks to 14 Days of Age

No. of Weeks Dams were Fed Creeping Indigo Leaf Meal	Gain to 14 Days of Age (grams)			
	Group 1	Group 2	Group 3	Group 4
4	92.3	96.7	98.1	98.2
6	74.2	80.2	74.4	85.3
8	70.0	67.7	63.1	57.0
10	79.9	73.9	39.1	no chicks
12	87.6	83.6	87.3	no chicks
14	79.9	74.3	77.3	no chicks
16	79.9	79.8	75.2	no chicks
18	55.2	64.2	60.9	no chicks
20	81.8	86.4	63.5	no chicks
22	87.4	77.0	71.1	no chicks
24	95.3	81.4	72.3	no chicks
X gain	80.3	78.6	71.1	—

Between rations 1, 2, and 3 $F = 3.198$ $P > 0.05$
Least significant difference between gains = 7.74

The livability of chicks to 14 days of age was also affected by the creeping indigo in the dams' rations. Among the chicks produced from dams fed ration 1 the mortality was 0.4 percent; the mortality of chicks from dams fed ration 2 was 3.6 percent; and that on ration 3 was 14.1 percent.

It was observed in trial 2 that pullets reared on a ration containing 5 percent creeping indigo meal were capable of egg production beyond 8 weeks, the limit obtained in trial 1. As shown in Table IV, these pullets attained a maximum rate of lay of 68.1 percent within 6 weeks after reaching sexual maturity. Subsequent production was less; it is not known whether these birds would have continued to lay or would have increased production since it was necessary to move them when they were 34 weeks of age. Nevertheless, the difference in rate of lay was significant between the pullets on 5 percent creeping indigo meal (ration 5) and the controls fed ration 1.

TABLE IV

Effect of Creeping Indigo Meal on Egg Production

Rations	Weekly Hen-Day Egg Production										
	1	2	3	4	5	6	7	8	9	10	11
1	16.3	26.5	47.9	59.2	62.2	73.5	78.6	74.5	68.4	64.3	61.2
5	0.0	2.5	6.7	16.0	38.6	56.3	68.1	63.0	42.8	25.2	23.5

Between rations $F = 52.115$ $P < 0.01$

It was possible in this trial, also, to determine the effect of 5 percent creeping indigo meal on hatchability. Following

four hatches, the birds fed ration 1 had an average hatchability of 91.9 percent whereas those fed ration 5 averaged 57.1 percent. This difference was highly significant. It may be concluded that 5 percent creeping indigo meal definitely depressed hatchability even though the dams had been acclimated to it.

DISCUSSION AND CONCLUSIONS

Laying chickens that had been reared on a creeping-indigo-free diet were adversely affected by creeping indigo leaf meal. In this study, it was observed that egg production, body weight, and feed consumption were reduced and that the magnitude of the effect appeared to vary in accordance with the concentration of the meals. Hatchability, livability of chicks, and their growth rate were also impaired by the transmission of a toxic principle through the hatching egg. Although laying birds that had been reared on a diet containing creeping indigo meal were able to tolerate this meal to a greater degree, hatchability was depressed in that group when a concentration of 5.0 percent was fed.

These results substantiate the idea that a toxic principle in this species of *Indigofera* has a deleterious effect on domestic animals. Emmel and Ritchy (1941) have reported that this member of the legume family was toxic to New Zealand rabbits, and, as stated above, Nordfeldt and Younge (1949) have observed premature births of stillborn calves. It would appear advisable, therefore, that widespread search and assays be undertaken to determine whether any species or strain of *Indigofera* now exists that is non-toxic or at least less toxic to animals. Since the chicken is sensitive to *Indigofera endecaphylla*, it may prove to be the most economical test animal with which to conduct this survey.

On the basis of this study it is not advisable to feed more than 1.25 percent creeping indigo leaf meal to laying birds; indeed, there does not appear to be any advantage in feeding it at all.

SUMMARY

Creeping indigo leaf meal adversely depressed egg production, body weight, and feed consumption of laying birds when quantities of 1.25 to 5.0 percent were fed. The effect varied in accordance with the concentration. Egg production was reduced to zero within 8 weeks in the group fed a ration containing 5 percent creeping indigo leaf meal. Pullets raised on a diet containing 5 percent creeping indigo meal were not as sensitive to the toxic principle in the meal and did not

cease production within 11 weeks, at which time this phase of the study was terminated. Their production was also significantly poorer than that of the controls. Hatchability was not reduced in this study when concentrations of 1.25 and 2.5 percent creeping indigo leaf meal were fed. Five percent creeping indigo meal significantly reduced hatchability.

It is suggested that the toxic principle contained in the strain of *Indigofera endecaphylla* tested in this study can be transmitted through the hatching egg. Chicks from dams fed creeping indigo leaf meal did not grow as rapidly or survive as well to 14 days of age as did chicks from hens fed the control diet. The effect on the chick was influenced by the concentration of creeping indigo leaf meal fed to the dams.

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RELATION OF GROWTH STIMULATING PROPERTIES OF ANTIBIOTICS TO UNIDENTIFIED GROWTH FACTORS REQUIRED BY THE CHICK

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Investigations on the animal protein factor, using a short chick growth test (2 weeks) disclosed that the antibiotics, aureomycin and streptomycin possessed extraordinary growth stimulating properties. When the basal APF deficient diet (50 percent soybean oil meal) contained crystalline B_{12}, a mixture of B-complex vitamins (thiamine, Ca pantothenate, pyridoxine, folic acid, and biotin) and either aureomycin or streptomycin growth was much superior to that obtained with B_{12} alone. It is believed that the antibiotics stimulate growth indirectly by changing the intestinal microflora from "undesirable" to "desirable" types and that unknown factors synthesized by the "desirable" types are responsible for the growth effect. Evidence has been secured which suggests that the "whey factor" may be one of the factors synthesized by the "desirable" types. Moreover, in combination with streptomycin, the five B-complex vitamins previously mentioned appeared to greatly augment intestinal synthesis of the "whey factor." (Abstract—Poultry Science 29: 760, 1950.)

THE CONTROL OF LEUCOSIS IN THE FOWL*

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The characteristic feature common to the various forms of avian leucosis is the accumulation of undifferentiated lymphocytes in the nerves, in the visceral organs, or in the iris. However, since different parts of the body may be affected, it is not surprising that the disease should have many names: fowl paralysis, lymphomatosis, neurolymphomatosis, the avian leucosis complex, iritis, and "big-liver disease." Some pathologists also include osteopetrosis, or marble bones, as one form of this complex, but flocks highly susceptible to all other forms of leucosis may never show a case of marble bones.

The evidence to date indicates that the disease is caused by a virus or, more likely, by several different viruses. Although many studies have been made of the ways in which these causative agents are spread and maintained, there is still much to be learned. In the present discussion of control measures, it is assumed that in populations where the disease is enzoötic, the causative agents are ubiquitous, and inescapable except by the most rigid special precautions.

CONTROL BY ISOLATION

A. *Complete isolation*

The feasibility of reducing losses from fowl paralysis to an insignificant figure by strict isolation was demonstrated by Kennard and Chamberlin (1936) in the U.S.A. and by Johnston and Wilson (1937) in Scotland. Chicks taken from the incubators to isolated rearing ranges are mostly resistant to the disease when brought back to infected premises at about 5 months of age. At Cornell University, Dr. R. K. Cole and I have found that birds with a high degree of genetic susceptibility may still contract the disease when exposed at 160 days of age. However, these are the exceptions.

For those who can maintain an entirely separate establishment for rearing their birds, isolation provides the most effective control. To be effective, it must begin as soon as the chicks come out of the incubator. We have found that exposure for two weeks after hatching is enough to ensure a high death-rate later from leucosis (Hutt *et al.* 1944). In fact we now get,

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* An address given to the Netherlands Branch of the World's Poultry Science Association at Utrecht on Sept. 22, 1950.

in our strain bred for susceptibility, losses exceeding 50 per cent following an exposure that is severe for only 13 days after hatching.

Complete isolation entails not only a separate farm or location for rearing, but also separate equipment and attendants that have no contact with older birds. The effectiveness of this method of control has been established by those poultrymen who have been able to use it. Unfortunately, many of us are not able to maintain two separate establishments—one for laying birds and one for growing chickens. Some manage it by getting a farmer who has no poultry of his own to rear the birds to maturity.

B. *Partial isolation*

Poultrymen unable to provide complete isolation can still reduce their losses from fowl paralysis by brooding their chicks as far as possible from the old hens and by reducing traffic between these two groups to a minimum. It was a great surprise to find that our chicks brooded for the first two weeks 110 feet from the nearest laying pen got a less severe exposure to leucosis than their sisters brooded in the same year only 40 feet from old hens. This difference was maintained consistently during seven annual rearing seasons. It could not be ascribed to any difference in management other than that in distance from the old hens. Although this difference in exposure lasted only 13 days, after which the chicks all went to the same rearing range, it was enough to make later deaths from leucosis in the birds brooded near the old hens two to three times as high as they were in the others.

Other evidence has since confirmed this indication that brooding chicks as far as possible from the old hens, even if the same equipment and attendants must be used for both, is about the best protection (short of complete isolation) that can be provided. The most critical period lies in the first few weeks after hatching.

CONTROL BY BREEDING

The early evidence of Asmundson and Biely (1932) that families differ in susceptibility to fowl paralysis can be confirmed by almost any breeder who examines his records. Such genetic differences among families, when properly manipulated, can be effectively used to reduce losses from this disease. There are essentially two procedures available—mass selection and progeny testing.

A. *By mass selection*

With this system one uses unpedigreed birds or ignores pedigrees, and breeds only from what our poultrymen call yearlings, or from hens still older. Actually, yearlings are about two years old when used. If the stock has been exposed to the paralysis complex, and the most susceptible birds thus eliminated by natural selection, the survivors should transmit some of their own genetic resistance to their offspring. That they do so was shown by Kennard (1933) and by Gildow *et al.* (1940) who compared yearlings and pullets with respect to losses from paralysis in their offspring. Their results were as follows:

	Paralysis (%) in offspring of:	
	Hens	*Pullets*
Kennard, first year	12.5	20
Kennard, second year	16.0	30
Gildow *et al.* Series I	27.4	34.7
Gildow *et al.* Series II	17.0	24.6

These data suggest that with mass selection of this sort losses from paralysis should be more than 7 per cent below those that would be experienced when hatching only from pullets. If the hens used for breeding have been properly culled, they should be better than the pullets in other respects, as well as in demonstrated viability, hence this method of reducing losses has much to be commended.

B. *By progeny testing*

As with other multifactorial characters, when breeding for resistance to leucosis one goes farther and faster with the progeny test than with mass selection. Incidentally, the progeny test is more exciting.

For the past 15 years, Dr. Cole and I have been breeding two strains of White Leghorns resistant to this disease, and one strain that is highly susceptible. The procedure during that time has been (1) to pedigree all chicks, (2) to ensure a natural exposure to leucosis, (3) to maintain as nearly as possible a uniform environment for all birds, (4) to determine the cause for every death after the age of 6 weeks, and (5) to breed from sires and dams proven to produce offspring that are comparatively resistant to the disease and otherwise desirable. The testing period is from 43 to 500 days. Details of the experiment and some of the results have been given in previous reports (Hutt and Cole, 1947b, 1948).

In the two resistant lines, deaths from leucosis among females hatched from proven-sire matings are now usually

less than 10 per cent and sometimes less than 5 per cent. These are averages for the strains; some individual sires may lose no more than 3 per cent. This is not too bad for a test period of 458 days, and for birds that are never culled, even when housed. It is particularly good for birds exposed so severely that in the Susceptible line deaths from leucosis are well over 50 per cent in the same period. Since birds of all three strains are mixed together right from hatching, it is evident that they must all be getting an adequate exposure.

In the population hatched in 1949, which will finish its test about September 15th, 1950, the records up to July 1 for 28 previously untested sires in the two resistant lines were as given below. Since no cockerels of the Susceptible line were tested in 1949, the proven-sire matings of that strain are used for comparison to give some idea of the severity of exposure.

	Sires *Number*	Daughters at 43 days *Number*	Deaths from leucosis *Per cent*
K—Resistant	13	813	4.2
C—Resistant	15	650	6.9
Susceptible	4	343	63.8

The general reduction of deaths from neoplasms over a period of years is shown in Figure 1. Actually the improve-

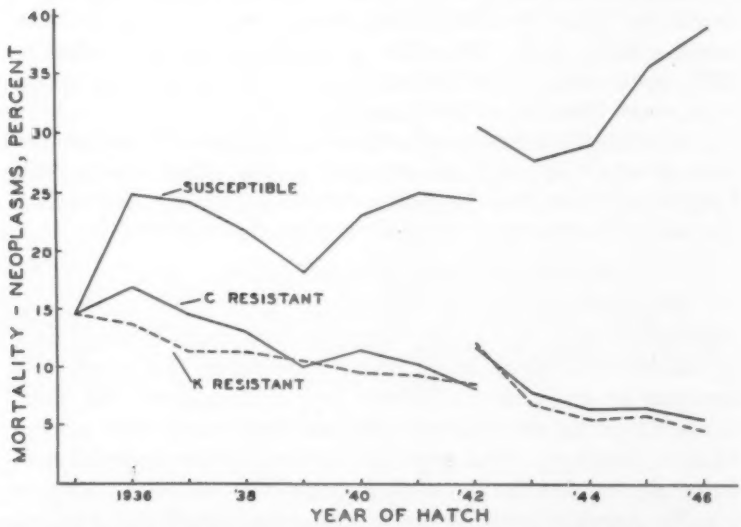

Figure 1. Differentiation of lines resistant or susceptible to leucosis as a result of selective breeding during 11 years. The break in 1942 separates populations severely exposed then or later from those lightly exposed in the earlier years. Of the neoplasms, 90 to 95 per cent were cases of leucosis.

ment effected by selection was much greater than the graphs in that figure show. Since 1942 the exposure has been more severe than in the first seven years of the experiment, and some obscure forms of leucosis are now recognized at autopsy that were missed in earlier years. The reduction of mortality from all causes as these strains increased in resistance has been remarkable.

RESISTANCE, EGGS, AND ECONOMICS

Strains of mice and rats resistant to disease have been bred in more than one laboratory, but the problem is more complicated with domestic fowls. The latter have to be satisfactory not only from the standpoint of resistance to disease, but also in ability to lay, in size of egg, in body size, and in ability to reproduce. None of these objectives is incompatible with resistance to leucosis, but it is much more difficult to improve 5 characters than one. To do it, one must test many cockerels annually in order to find the few that transmit superiority in all the things that are valued.

For the poultrymen with many breeding pens it is easy to test many cockerels each year. Having only 10 pens available for such tests, we have used since 1943 a system of multiple shifts by which those 10 pens are made to test annually 30 cockerels and even the 40 that we tried in four successive shifts this year. Details of this system have been given elsewhere (Hutt, 1949, Chap. 15). If we had put it into effect in 1936, we should probably have made by its use more progress in 5 years than we actually made in ten.

Along with resistance to disease, egg size and size of bird were soon raised in our Leghorns to the point where little further selection was necessary, but laying ability, although it has steadily improved, will always need consideration.

PRACTICABILITY OF GENETIC CONTROL

The feasibility of breeding birds resistant to leucosis and capable of high egg production has also been demonstrated at the Alabama Experiment Station. However, the breeder not financed by governmental funds may well question the practicability of his developing such resistant stock. The answer to that question is that some of the best breeders are already doing it, and are finding that it pays. This is particularly so for the hatcheryman whose chicks must stand the gaff on many a farm where they get exposed to leucosis. As one of them wrote, when asking for advice on how best to expose some of his pedigreed stock:

"We have not had much paralysis on our farm. We also have many customers who say that they house more pullets than they pay for. On the other hand, we have some customers who just cannot grow our stock because they have so much paralysis. We feel we have a top-notch breeding farm and we would like to tackle this paralysis in a realistic way."

Certainly it is hardly practicable for any breeder to maintain a highly susceptible strain, as we do at Cornell. But that is not essential. Neither is it practicable to expose all the chicks each year. That is not necessary either. It should suffice to expose only a sample from the pedigreed matings—perhaps 3 hatches out of ten—, just enough to show up the best and worst families. The necessary exposure can usually be ensured by brooding the chicks close to old hens, using the same attendant for both. Sometimes they get it even when held in battery brooders in a room where there are some old hens in other batteries.

Apart from these samples that are exposed, the breeder should rear the rest of his stock in isolation, or in partial isolation, just as the commercial poultryman should do. When a fair degree of resistance has been established by some years of selection, it may then be feasible to expose a large proportion of the flock without incurring serious losses.

Some breeders attempting to develop stock resistant to leucosis have, in a few years, reduced the disease to an insignificant figure, only to find that their supposedly resistant stock suddenly becomes susceptible again. The trouble in such cases is that the flock has "run out of exposure," and hence appears highly resistant. Sires whose daughters are unexposed may appear to be transmitting high viability, but exposed daughters of these same sires may reveal an entirely different story (Hutt, 1949; p. 525). The safest plan is to ensure some exposure annually. Admittedly the best ways of doing this have yet to be discovered, but the surest way seems to be to have some old hens close to the brooders.

UTILIZATION OF RESISTANT STOCK

Indications are that the best practical control of fowl paralysis is secured by raising genetically resistant stock in the best possible environment, *i.e.* in isolation, whether complete or partial (Figure 2). The breeder or hatcheryman who distributes chicks from such stock should therefore not leave all the battle to their genes, but should make every effort to

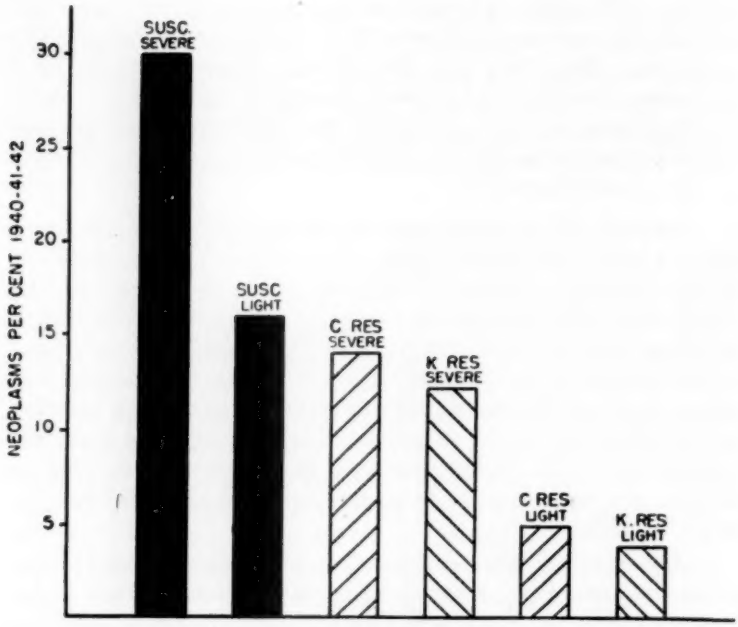

FIGURE 2.

Figure 2. The effects of heredity and environment on the incidence of leucosis during three years. The susceptible strain lost 30 per cent, when severely exposed, about half as many when lightly exposed. The two resistant lines withstood severe exposure well, and gave effective control when lightly exposed.

ensure that the customer does his part by brooding these chicks far away from older birds.

There are some indications that cockerels of a resistant strain, when used on unselected stock, will transmit a high degree of resistance. If further evidence confirms these first trials, it is clear that the maximum utilization of the good genes accumulated in resistant strains will be obtained by using cockerels of such strains to head supply flocks for the hatcheries.

TESTS FOR RESISTANCE OF DIFFERENT STRAINS

After it became evident that flocks which have experienced leucosis for several years (and hence have undergone some natural selection) are safer sources of chicks than flocks which have never been exposed, it was not long before breeders began making claims that they had strains resistant to this disease. Just as the first laying tests were set up to reveal which stocks had superior ability to lay eggs, the first test is

now under way in New York State to compare the viability of different strains—particularly their resistance to leucosis. It is a test not solely of viability, but of that happy combination of abilities to survive and to lay well that is necessary for maximum profit.

The entries in this test consist of 52 unpedigreed pullet chicks which have to be selected at random from many hundreds by some approved, disinterested agent. It is thus a "fair-sample" test. The unique thing about it is that on receipt of the entries at Cornell University the chicks are all exposed to leucosis for three weeks before going to the rearing range. Their productivity and viability will be determined to 500 days of age. Names of the outstanding strains will be announced, but, by the use of code numbers, breeders of the more susceptible stocks will be protected from public exposure. The point of interest to us in this discussion is that there were over 70 breeders who applied for this opportunity to test the ability of their birds to withstand leucosis and to lay. Unfortunately the space available permitted acceptance of no more than 33 entries.

THE WILL-O'-THE-WISP OF EGG TRANSMISSION

For some years it has been claimed by Waters (Waters and Prickett, 1944; Waters, 1945, 1947) that the agents causing leucosis are transmitted through the egg to the chick, thus establishing a focus of infection for the new generation. This claim has now been extended (Waters and Bywaters, 1949) to include a theory that chicks are infected in the incubator by dissemination there of the causative virus. These theories have been clutched by despairing poultrymen as a drowning man grasps at a straw. They have been enlarged and circulated by the world's poultry press to such an extent that many a poultryman now expects that his troubles will soon be ended by the discovery of some simple test whereby reactors carrying the virus may be detected and eliminated. I am not one of these cheerful optimists.

By reciprocal crosses between resistant and susceptible strains it was shown that, whether the virus goes through the egg or not, any such transmission is of no consequence whatever in comparison with the genes that the chicks gets through that same egg from his sire and from his dam (Hutt and Cole, 1947a). It was also shown that even birds that died of leucosis, which should have been able to infect their offspring through the egg if any birds can, did not produce in the months

preceding their deaths chicks any more susceptible than those of hens that did not die of leucosis (Cole, 1949).

Recently we have used our Susceptible strain of White Leghorns to get a little more light on this question (Cole and Hutt, 1951). Chicks of this strain that were exposed to infection in 1948 and 1949 suffered mortality from leucosis of 54 per cent in one year, and over 64 per cent in the other, before they were 500 days old. At the same time, two hatches were raised each year in comparatively good isolation. Among 280 pullets thus isolated, only a single case of leucosis developed while they were isolated. After they were returned to infected premises at 160 days of age, mortality from leucosis to 500 days was only 9.4 per cent in one year, and even less in the next. If the causative agents are transmitted through the egg, these birds should have shown some effects if any would. The evidence indicates that those which did die of leucosis got their infection—not through the egg—, but from the exposed population, after the isolated birds were brought back to winter quarters.

In this connection, the recent findings of Oakberg (1950) have a special interest. They support the previous evidence of Pappenheimer *et al.* (1926) that lymphomatosis exists in some form in most chickens that have been exposed, if not in all. It seems probable, therefore, that if any test for carriers be devised, it would disqualify practically every bird in the breeding pen. This evidence of general infection is consistent with the fact that highly resistant birds, that have withstood severe exposure and produced highly resistant offspring, will sometimes succumb to leucosis when old age has broken down their natural defenses. The hope of eradicating the disease by eliminating carriers is a will-o'-the-wisp.

CONSOLING PHILOSOPHY

There is nothing new about having to live with a disease instead of eradicating it. Most of us are so resistant to chicken pox, measles and whooping cough that we accept them as normal occurrences. Unexposed primitive populations in which there has been no natural selection, do not fare so well with these diseases. In North America about 95 per cent of the adults show by blood tests that they have been exposed to one or more of the viruses causing infantile paralysis. We do not eradicate these reactors. It is only the few, who are genetically highly susceptible, that have trouble. We do our best to save them, and thus to frustrate natural selection. In

contrast, so far as fowl paralysis is concerned, natural selection can be utilized to the full. It can be supplemented by careful breeding to eliminate susceptible families, to accumulate genes for resistance and ultimately to produce stocks that can withstand ordinary exposure to the disease.

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In the Sixth Thailand Egg Laying Contest 3 birds laid over 300 eggs. One Rhode Island Red laid 318 eggs, one White Leghorn laid 305 eggs and another White Leghorn laid 301 eggs.

SPANISH BREEDS OF CHICKENS

The Origin of the Utrera Breed

J. G. PIEDRAFITA
Carcastillo (Navarra), Spain

THE INITIAL GROUP

In the spring of 1926 at the 'Santa Matilde' poultry farm, several hundred eggs were incubated. These eggs had come from the poultry yards of the town of Utrera (Prov. of Sevilla). Their shells were strong and somewhat rough, generally white in color, although some were rather brown or pinkish.

Four hundred and twenty-one chicks were hatched. They were large, strong, and lively, and their coloring was highly varied. They withstood the brooding period very well, although it was carried out under rather primitive conditions due to the lack of adequate space and equipment.

At the end of the growing period, some 191 pullets and cockerels were selected for their good shape and sound appearance to serve as breeders the following season. This was the original stock of the 'Santa Matilde' poultry farm. Those birds represented a mixture of every type and plumage that was, and is still found, in the Andalusian countryside. No particular color predominated nor were there any exemplary birds present, who, for their good shape, might give rise to the hope of future improvement in the appearance or uniformity of the progeny.

From the beginning, the egg production of the pullets was recorded daily and at the end of the first year the average production was 110.85 eggs. The maximum production was 189 eggs and the minimum 53. This was the beginning in the method for selection that was practiced thereafter.

SELECTION

During the following years, the recording of the production was continued systematically and has not been interrupted since then except for a few days in July of 1936.

Selection during the first five year period was limited to the annual formation of a single breeding pen, uniting the best layers of the previous year with the cocks of the best hens, also of the previous year. These selected layers had shown early, intense, and persistent laying and had been found free of undesirable hereditary traits. Their eggs were of the required good size.

With this system, the outward appearance of the fowl improved very little. Some tendency toward uniformity of form and shape was noticed, but the situation grew worse with regard to the variety of colors. The free mating of hens and cocks of mixed plumage in a single pen produced such a bad mixture of colors that an example of a single-colored bird was a rare thing.

The results in egg production were quite different. It is sufficient to say that in only five years the average production per bird, which had been 110.85 in 1926, had risen to 187.34 eggs as an average for the hens of 1930-31. In order to evaluate these figures accurately, we must bear in mind that, except for the first year in which all were pullets, more than a third of the flock was composed of second and third year birds. In spite of this, the average refers to the entire flock.

The satisfaction was even greater when it was discovered that this splendid advance was made without losing any of the natural vigor of the race. This was demonstrated by the almost complete absence of diseases, and by the brooding of the chicks without difficulty, with an insignificant mortality rate. Both facts give the clearest index to the constitutional vitality of a breed.

At this point the necessity of attempting to standardize the shape and color of these fine layers became apparent, if they were to be offered to other poultrymen as good, productive stock from which they could expect to benefit in the egg market.

In order to obtain this standardization a system of selection by lineage was begun in 1931, establishing two or more lines for each of the varieties in formation. For this purpose a number of small breeding pens were installed into which were put those birds which had the best laying qualities and which presented the best visible characteristics within the limits of the variety to which they belonged. As there was only one cock put into each pen, there could be no doubt as to the paternity of the progeny.

The eggs (pedigreed) collected in these pens were incubated separately, reuniting and isolating those of the same mother, so as to avoid the confusion and mixing of the chicks at birth. The practice followed for the marking and identification of these chicks was the pedigree method, so widespread today, but which at that time was not practiced in Spain except in isolated cases and always on a small scale. It is

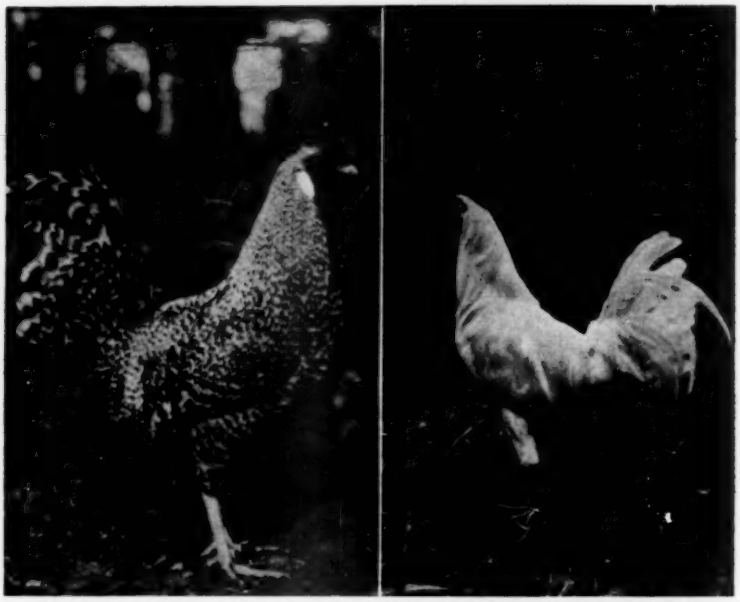

Figure 1. Cocks of the Barred and White Utrera breed of chickens.

almost certain that at that time, the 'Santa Matilde' farm was the only one to make use of this method to any great extent. It suffices to say that since then some 10,000 eggs have been incubated there annually solely for the reproduction of the breed.

The results were not long in appearing. In a very few years the distinct varieties with precise shapes and colors were well defined. The most difficult part of the task was to erase the small defects; the spots of foreign color on each variety, and above all, to maintain in all of them the good laying qualities which had been secured from the first. All this which seemed so difficult was also achieved in the end without more tools than time and patience.

THE VARIETIES

Now, given the origin and characteristics of this fowl, the International Standard of the Andalusian Blue hen was chosen as a type for the orientation and fixation of its shape. It was chosen as a standard because it was considered the most appropriate for these birds, because of its outstanding beauty and elegance among the Mediterranean race, and because it also enjoys the advantage of being well known and

respected by the poultrymen of Spain and of the rest of the world.

The color variations desired of each variety were introduced on the outline of the Andalusian Blue, but still conserving the Blue type that had been chosen as a common Standard of all the Utrera hens as a warranty of their racial brotherhood and communal origin.

At present there are four varieties of Utreras that have been established at 'Santa Matilde' and they correspond to those whose plumage is found pure to type with some frequency in the poultry yards of Utrera; namely, White, Black, Barred, and Partridge.

The White, Black, and Barred Utreras are already well known by all poultrymen because they are found in the stocks of important farms in all the peninsular provinces, as well as in the Canary and Balearic Islands, and in the Spanish territories in Morrocco and on the Gulf of Guinea.

Their diffusion in large and small groups is greater every day, and it is estimated that among all poultry establishments a million and a half Utrera chicks are produced every year.

The Partridge Utrera variety is still in selection and, if all goes well, it is hoped that it can be presented to the public in a very short time.

At the Second Poultry Conference which took place in Barcelona in May, 1946, the White Utrera variety was presented. Its archtype or Standard was officially approved and is described below.

The Standard of the Barred Utrera was unanimously approved at the Fourth Poultry Conference, held in Madrid in November of 1948, and is given below.

STANDARD FOR THE WHITE UTRERA

	Weight (in Kilograms)		
Cock	3.000 K.	Hen	2.300 K.
Cockerel	2.600 K.	Pullet	1.800 K.

SHAPE OF THE COCK

HEAD—Moderately long and broad, rather thick.
BEAK—Medium and strong.
EYES—Large and bright.
COMB—A little larger than medium size. Deeply serrated with 5 or 6 points, roughly following the line of the neck.
WATTLES—Long, wide, narrowing and rounding at lower extremity.
EAR LOBES—Medium size.
NECK—Rather long and gracefully curved.
WINGS—Long and closely tucked.
BACK—Long, wide and straight, inclining somewhat from the shoulders to the tail.
BODY—Long and concave, wide at the forepart and narrower in the saddle.

FLUFF—Short and close.
BREAST—Broad, deep, and well rounded, carried well forward and raised.
TAIL—Raised and not very long. Sickle feathers well curved.
THIGH—High and strong.
LEGS—Rather long and free of plumage. The hocks are clearly visible under the line of the body.
TOES—Four in number. Straight and delicate.
CARRIAGE—Graceful and elegant, expressing vigor and boldness.

SHAPE OF THE HEN

The morphological characteristics are the same as those for the cock except for sexual differences.
The comb falls to one side of the face covering one eye.

COLOR

The ear lobes and plumage are entirely white.
The beak, legs and toes are pinkish white. The comb, face, and wattles are bright red. The eyes are reddish brown. The eggs of the hens are white.

DISQUALIFICATIONS

A—300 grams or more above or below the standard weight.
B—Red on the ear lobes on more than 1/3 of their surface.
C—Ticks of foreign color in the plumage, but allowing a yellowish tone produced by the sun on the throat and wattles of adult birds.
D—Any color on the beak, legs, or toes, which is not white or pinkish.

Barcelona, May 1946

STANDARD OF THE BARRED UTRERA

Weight (in Kilograms)

Cock	3.000 K.	Hen	2.300 K.
Cockerel	2.600 K.	Pullet	1.800 K.

SHAPE OF THE COCK

HEAD—Moderately long and broad, rather thick.
BEAK—Medium and strong.
EYES—Large and bright.
COMB—A little larger than medium size. Deeply serrated with 5 or 6 points, roughly following the line of the neck.
WATTLES—Long, wide, narrowing and rounding at the lower extremity.
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BACK—Long, wide and straight, inclining somewhat from the shoulders to the tail.
BODY—Long and concave, wide at the forepart and narrower in the saddle.
FLUFF—Short and close.
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TAIL—Raised and not very long. Sickle feathers well curved.
THIGH—High and strong.
LEGS—Rather long and free of plumage. The hocks are clearly visible below the line of the body.
TOES—Straight and delicate.
CARRIAGE—Graceful and elegant, expressing vigor and boldness.

SHAPE OF THE HEN

The morphological characteristics are the same as those for the cock except for those differences due to sex.
The comb falls to one side of the face covering one eye.

COLOR

On each feather there are alternating bands of light and dark gray forming transversal bars. The ear lobes are pure white. The comb, face, and wattles are bright red. The eyes are reddish brown. The beak, legs and toes are pinkish white. The eggs of the hens are white.

DISQUALIFICATIONS

A—300 grams or more above or below the standard weight.
B—Red on the ear lobes on more than 1/3 of the surface.
C—Red or gold ticks on the plumage and feathers entirely black or white.
NOTE—The presence of gray spots on the beak, legs or toes is not disqualifying.

Madrid. November, 1948

"EGG WHITE" FROM FISH

Norwegian chemists have discovered a satisfactory way of producing "white egg" or albumen from fish and fish waste, according to a report dated May 20, 1950, from the Norwegian Information Service.

Before the war, the Germans were producing a similar product, but it was not sufficiently pure to win favor in the world market, in competition with "egg white" produced from milk, peanuts, coconuts, soyabeans, etc. The German product tasted and smelled too much of fish.

The pure Norwegian product now achieved is the result of cooperation between two firms. Trial production has been started at the rate of 600 pounds of dried "egg white" a day, equal to the daily output of 100,000 chickens. Production is carried out by a completely chemical-mechanical process. One gram, or one thirtieth of an ounce, of the powder is sufficient to produce 3 to 4 pints of "cream," which whips and mixes easily. In several respects the artificial product is claimed to be better than natural egg white, and one pound of it is equivalent to that contained in about 150 chicken eggs. The product contains 80 to 90 percent pure protein and can be used for baking, ice cream, puddings, fromage, soup powder, mayonnaise, pharmaceutical products, in paints and varnishes, in the textile industry, as well as for paper, cosmetics and soap. A price of about $2.50 per pound is indicated for the best quality. (Copy from: United States Department of the Interior, Fish and Wildlife Service, Branch of Commercial Fisheries, Market News Service.)

GIVE BUILT-UP LITTER A CHANCE TO FUNCTION

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Built-up litter can do wonders when given a chance to function under favorable conditions. It is well known that built-up litter can be made an effective sanitation procedure and a potent source of valuable nutrients, especially of the animal protein factors, including vitamin B_{12}. More consideration, however, needs to be given to the management requirements to give built-up litter a chance to do its work.

THE BIG FOUR

Four primary requirements are necessary to provide the favorable conditions under which built-up litter can function effectively:

1. *Depth*—Built-up litter needs to be 6 to 12 inches deep to give it the necessary volume or reservoir for absorption of the fresh droppings and dampness without becoming caked, and for various chemical and biological activities.
2. *Stirring*—To keep the litter in a better and more absorbent condition the litter needs to be stirred whenever it begins to paste or cake over the surface. Moreover, by stirring, the fresh droppings and polluted surface materials are mixed with the material below where owing to the chemical and biological activities, sanitation takes place. The sanitation which takes place in built-up litter is similar to that of the compost heap.
3. *Moisture*—The chemical, biological, and sanitation activities in built-up litter require moisture, in the amount usually present in litter without artificial floor heat. The continuous supply of moisture from droppings and from around the watering equipment is usually sufficient even during dry summer weather when the litter appears dry and may even be dusty. The benefits of built-up litter can not be realized from heated floors where the litter is too dry and shallow.
4. *Heat*—The heat necessary to facilitate the chemical and biological activities in built-up litter usually needs no special attention except during prolonged cold weather. Even then sufficient heat is usually provided by the birds and from the litter in reasonably well in-

sulated houses, to maintain a temperature of 5 to 20 degrees F. above outside temperature during cold weather. Moreover, the temperature of functioning built-up litter would be considerably higher and less fluctuating on ground floors (concrete or earth) than that of the room.

STARTING NEW BUILT-UP LITTER

Built-up litter can be started at any time. It is important that the start be made with a generous amount (4 to 6 inches) of litter and that additions be made as needed when it starts to paste over the surface. None should be removed until necessary to keep it within a convenient depth of 8 to 12 inches. When removal becomes necessary, never less than 6 to 8 inches should be left for continued use. The removal can be made from the most convenient part of the pen clear to the floor and the remaining litter leveled off to the proper depth. It may sometimes be preferable to remove the upper part of the litter, especially if caked over the surface, and allow the finer, more compost-like material below to remain for continued use.

LITTER MATERIALS

Any of the materials commonly used for floor litter such as chopped straw, wood shavings, sawdust, ground corn cobs, oat or peanut hulls, cane, peat-moss, etc. can be used to start a built-up litter. The principal requirement is that the litter material be sufficiently fine to stir readily and that a sufficient amount of the material be used at the start.

THE WET LITTER PROBLEM

The principal causes of wet litter are overcrowding, insufficient age and depth of litter, faulty housing, improper watering equipment, and weather conditions. Other contributing causes are the size of birds, rate of growth and egg production, and the feed. The problem of wet litter occurs mainly during late fall, winter, and early spring. Excessive moisture is less of a problem in old than in new built-up litter. Stirring old built-up litter when it starts caking over the surface will often take care of the moisture problem. New first year built-up litter needs, in addition to stirring, additions of fresh litter from time to time until it reaches a depth of 6 to 8inches, after which stirring is all that is necessary under average conditions.

Under certain adverse conditions, however, the litter will also need to be limed to keep it in a better and more absorbent

condition. Either hydrated lime or pulverized limestone may be added and stirred into the litter at the rate of 10 to 15 pounds per 100 square feet of floor space as often as needed when excessive moisture is a problem.

Lime should be added only when there is considerable dampness; otherwise the lime may give rise to too much dust. In the brooder house there is usually no need for adding lime to the litter until after the first 4 to 6 weeks or until the litter begins to cake over the surface despite occasional stirring.

The litter first gets in bad condition (caked) around water and feeding equipment. A common practice is to remove the caked and/or wet part of the litter. This may or may not be a desirable procedure. It is desirable if only a small amount is removed and if it is fully replaced each time by fresh litter, regardless of the cost, to maintain the necessary depth of 6 to 8 inches. To do this requires a much greater volume of fresh litter than that of the caked or wet material removed. If the caked or wet material from around water and feeding equipment is removed without adequate replacement with fresh litter, the built-up litter soon degenerates into a more or less solid mass of 3 to 4 inches of built-up droppings, which of course, is objectionable. It would often be better from the point of sanitation and economy not to remove the caked or wet material. Just pile it in a heap in another part of the pen where it will again become disintegrated into desirable loose absorbent litter material and be more valuable than fresh litter. Chickens like to work down a heap of material and the excessive moisture will be dissipated by the heat generation in the pile.

HOUSING FOR BUILT-UP LITTER

Built-up litter gives rise to some special housing considerations. In the first place, there should be 12 inches additional height of the ceiling to make room for the deeper litter. In frame structures the foundation should be carried 3 or 4 inches above the surface of the litter when at full depth to prevent deterioration of foundation sills.

With built-up litter comes a trend back to earth floors. The primary purpose of a concrete floor in connection with fresh litter was to have something to clean, scrub, and spray. Now with built-up litter sanitation, why have a concrete floor in brooder or laying houses? In upper floor structures a wood floor is generally the most practicable and under built-up litter should last many years. An upper floor at the Station's Poultry Plant is practically as good as new after 20 years' use

for layers. New laying or brooder houses with upper floors should be built to carry the extra weight of built-up litter. Old structures need to be reinforced.

Portable colony houses with wood floors 6 to 18 inches above the ground are not as well suited to the use of old built-up litter as permanent buildings with ground or upper floors.

Built-up litter calls for increased ventilation at times, especially in the brooder house, to lessen the concentration of ammonia when mild humid weather follows a period of colder weather. Too little ventilation and too much ammonia may cause irritation of the eyes and lessen the rate of growth.

STIRRING THE LITTER

Built-up litter is one of the greatest of labor-saving procedures. The time and labor of stirring the litter is but a fraction of that previously involved in the removal and renewal of the litter at frequent intervals. Stirring the litter is a seasonal task during late fall, winter, and early spring owing to weather conditions. During the balance of the year little or no stirring is necessary.

CALL IT BUILT-UP LITTER

Built-up litter is what the name implies. It is sometimes referred to as "deep" or "dry" litter. These terms are misleading. Deep or dry litter can be far different from and without the beneficial properties of built-up litter.

WHAT DOES VACCINATION MEAN?

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The strict meaning of a single word—such as 'vaccination'—might appear to be of little importance to flockowners and others interested in the health of poultry. But, a wider understanding of the definition of this word is desirable. And, by contrast, a better understanding of the factors involved in the procedures which in popular usage are called vaccination should also make the control efforts increasingly effective for certain poultry diseases.

The term 'vaccination' originated several hundred years ago from the use in man of the agent of cowpox, as grown then and now in cattle, to protect against human smallpox. This living agent of cowpox is unable to produce in man the skin lesions and other severe disturbances that occur in smallpox. This original vaccination practice exists today as a means for the suppression of smallpox.

During approximately the past thirty years, the popular application of the word 'vaccination' has come to mean the use of a rather large variety of products. Very few of these are related in principle to the product originally and still used in true vaccination, namely vaccine. Some of the products are so removed in this relationship as to be nearly comparable to the procedure practiced centuries ago of inoculating children with smallpox virus in a sole attempt to suppress smallpox.

Among the procedures used today to produce some measure of protection, or immunity, to poultry diseases, only one involves the basic principle of vaccination. This is the use of pigeon pox virus in combatting fowl pox of chickens. The use of the living viruses of fowl pox, laryngotracheitis, Newcastle disease and infectious bronchitis to produce some resistance to the respective diseases constitutes little less than the wilful reproduction of the true disease or a form of it. The agents used in these four cases, as in the instance long ago of the use of the smallpox agent itself on children, are capable of reproducing the true disease upon being transmitted from the 'vaccinated' individuals to others having no resistance to them.

It is true that the use of the causative agents of fowl pox, laryngotracheitis, Newcastle disease and bronchitis can be regulated to some extent in matters of degree, route, and time (age of birds) of exposure of the domestic birds to them. This regulation minimizes the losses in the birds that are wilfully made hosts to the disease-producing agents as compared to the losses that might occur if the disease came about by other means and at other times, such as when eggs are being produced.

The fact should also be recognized that the five aforementioned viruses used to confer some resistance to poultry are produced in poultry or poultry eggs. This suggests the care that must be exercised in their preparation in order to do everything possible to prevent the spread of other diseases through the medium of the products intended for use in curtailing diseases.

A single vaccination against smallpox is not counted on alone to suppress this disease, but in addition all cases of the disease, are placed in quarantine and revaccination is often practiced in trouble areas. Hence, if a prevalent belief that some poultry diseases can be reduced by 'vaccination' to the extent smallpox has been suppressed, it is obvious that not only natural cases of poultry diseases but the 'vaccination' cases as well should be quarantined.

An improved application of the living, essentially unaltered causative agents of disease in the fight against certain poultry diseases can come from the understanding of what constitutes vaccination. The proper introduction and restriction of diseases wilfully introduced to suppress or regulate disease can be a benefit both on the individual premises and throughout the industry.

FAT RANCIDITY IN EVISCERATED POULTRY

V. The Effect of Dietary Sources of Linolenic Acid on the Development of Rancidity

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The resistance of poultry fat to rancidification was found to be primarily dependent on the amount of linolenic acid which had been deposited in the skin tissue. The amount deposited depended on the concentration of linolenic acid in the feed. If the later contained approximately ½% linolenic acid, as supplied by the addition of 1% linseed oil to the feed, the skin tissue fat contained 4% linolenic acid. The skin tissue fat of birds which had been fed 1 or 3% linolenic acid contained 12 and 28% linolenic acid respectively.

Although the stability of poultry fat was primarily dependent on the composition of the component glycerides, the amount and nature of the natural antioxidants were also factors governing the resistance of poultry fat to rancidification. Skin tissue fat contained only traces of tocopherol. The effectiveness of the latter as an antioxidant was increased, however, by the synergistic effect of the small amount of phospholipid in the skin tissue fat. (Abstract—Poultry Science 29: 768, 1950.)

REVIEW OF POULTRY PUBLICATIONS

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GENETICS

ASMUNDSON, V. S. *(Univ. of Calif., Davis, Calif.)* SEX-LINKAGE IN THE TURKEY. *Jour. Heredity 41:* 205. 1950.—Matings of albino hens with Bronze and Narragansett males produced Bronze progeny respectively; the results of all other matings were consistent with the assumption that the three genes form a triple allele series with the order of dominance N (Bronze), n (Narragansett) and n^a (albino).

Matings of heterozygous Bronze males to light brown (en—) females produced 666 Bronze Narragansett, brown or light brown progeny of which 206 or 30.9 percent were crossover combinations between N-n-n^a and E-e loci. (Experiment Station Record)

HAYS, F. A., and E. W. SPEAR. *(State College, Amherst, Mass.)* EMBRYONIC DEATH RATE AND SEX RATIO IN CHICKS. *Science 112:* 792, December 29, 1950.—These summarized data appear to suggest a linear decline in the percentage of males as hatchability increases . . . The greater portion of embryonic deaths occur in females and that the sex ratio approaches equality when few embryos die. (Experiment Station Record)

JUHN, Mary. *(U. Maryland, College Park.)* ABNORMAL FEATHER GERM ORGANIZATION WITH ASYMMETRICAL EXPRESSION IN A RHODE ISLAND RED FOWL. *Jour. Morph. 86:* 47-57. Illus. 1950.—A R. I. Red hen which showed a marked asymmetry is described. The bird was recorded as almost bare of down as a chick. Later the plumage of the left side of the body improved progressively but the feathering of the right side was very scanty and abnormal. The skin of the right side also was shrivelled, causing the right wing to be foreshortened. There was no asymmetry in the color of the eyes or in the tint of the skin. The scales of the shanks and feet and the small claw of the wing, however, were red-brown on the right and yellow on the left; the right eyelid was heavily black pigmented while the left eyelid showd only a dot of black. The abnormalities occurring in the feathering of the right side of the body are ascribed to altered conditions of growth of the feather germ which were caused by the obstruction presented to normal emergency by the constricted mouth of the feather follicle. This barrier to normal axial extension lead to the development of diminutive feathers exhibiting high degrees of curling and to most interesting examples of induced early origin of the after-feather, which thus came almost to equal the dwarfed main vane in size.—*Auth.* (courtesy Wistar Bibl. Serv.).

KEELER, CLYDE E., EDMUND HOFFMAN, and ROBERT K. SHEARER. *(U. Georgia, Athens.)* FADED BRONZE PLUMAGE. AN AUTOSOMAL MUTANT IN THE TURKEY. *Poultry Sci. 28:* 633-635. 1949.—Several "shorts" or mutants appeared in a pedigreed mating of bronze turkeys. Mortality was excessive in the poults and plumage color was faded with many broken feathers. Body size was smaller than that

of normal hens from same matings. Sex behavior was abnormally slow in developing. No offspring have as yet been secured from these "shorts." The sex ratio was normal.—*Lawrence Morris.* (Biological Abstracts)

KOSIN, I. L. *(Washington Agric. Expt. Sta., Pullman.)* A RELATIONSHIP BETWEEN THE WING DOWN PATTERN AND SEX EMINENCE IN NEW HAMPSHIRE CHICKS. *Jour. Heredity 41:* 8-12. 1950.—Evidence is presented to show the existence of a positive correlation between the sex dimorphic wing-down pattern and size of the sex eminence in day-old New Hampshire chicks. Moreover, the more distinctly "male" is the down pattern in the male chick, the more "male" is the sex eminence in appearance. The study involved 561 day-old chicks. It is suggested that endocrine-gene interaction is responsible for the existence of this parallelism. These associations were not found in the female chicks.—*Auth summ.* (Biological Abstracts)

LUHMANN, MARTIN. *Uber Domestikationsveränderungen bei Gänsen.* Verhandl. Deutsche Zool. Kiel 1948: 270-283. 1949.—Numerous new color types in geese are described and partially analyzed.—*H. Kumerloeve.* (Biological Abstracts)

MARCHLEWSKI, J. H. *(U. Krakow, Poland.)* THE SILVER PHEASANT HEN (GENNAEUS NYCTHEMERUS NYCTHEMERUS L.) AND THE DOMESTIC COCK (GALLUS DOMESTICUS L.) HYBRIDS OBTAINED BY MEANS OF ARTIFICIAL INSEMINATION. *Bull. Internat. Acad. Polonaise Sci. et Lettr. Cl. Sci. Math. et Nat. Ser. B: Sci. Nat.* [*Zool.*] *1949:* 231-240. 1950.—Of 36 eggs incubated, 14 proved fertile, one hybrid hatched and was reared to the adult stage. The living and all dead hybrids were females. The living specimen shows intermediate features of both parents with regard to color. The hybrid resembled the pheasant in body structure, but resembled the domestic fowl in skin appendages of the head and in tail feathers. No sexual activity of the hybrid was observed during its 1st yr. of life (to date).—*H. Szarski.* (Biological Abstracts)

MAUPIN, C. J., and E. W. GLAZENER. BREEDING FOR POULTRY IMPROVEMENT. *North Carolina Agric. Expt. Sta. Ext. Circ. 244.* 1-16. 1950.—Discusses inherited factors affecting egg and meat production. Definitions are given of some of the commonly used breeding terms. Pictures illustrating fast-feathering at different ages are presented. The breeding stages of the National Poultry Improvement Plan are listed with brief explanations. Data from R.O.P. records are used to indicate the value of family testing.—*C. J. Maupin.* (Biological Abstracts)

WARREN, D. C. *(Kansas State Coll., Manhattan.)* SYNDACTYLISM IN THE CHICKEN. *Jour. Heredity 41:* 31-34. 1950.—The data on syndactylism in chickens will permit no simple explanation of its mode of inheritance. The F_1 generation offspring varied from 0-50% syndactyls, and it appeared that the normal stocks to which syndactyls were mated influence incidence of syndactylism in the F_1 generation. No matings of syndactyls to syndactyls produced only syndactylous offspring although the syndactyls usually exceeded the normals from such a cross. The syndactylism here reported was in the White Plymouth Rock breed, and was not associated with leg feathering. There was no evidence of sex-linked factors influencing syndactylism.—*D. C. Warren.* (Biological Abstracts)

BREEDING AND FLOCK IMPROVEMENT—MEAT TYPE. *(Agri. Res. in Texas,* 1947-49, p. 151).—The Cornish breed has excellent meat type but its growth, feathering and reproductive qualities are generally poor. The Cornish has been crossed with New Hampshires, White Rocks and Leghorns. Backcross selections were made to fix the desirable market type and the other characters necessary in a good meat-type bird. The Station has a number of pens that look rather promising for crossing with the straight New Hampshire to produce a good broiler. (Experiment Station Record)

EARLY SELECTION OF BREEDING HENS POSSIBLE. *(Oregon's Agri. Prog. Through Res., 1950 Ann. Rpt., Sta. Bul. 491, November 1950,* p. 116.—Trials this year demonstrated that selection on the basis of performance during the first three months of production agrees very well with the selection which would have been made later.

Apparently there is a maternal effect on shell quality over and above that contributed by the sire.

Studies with Cornish eggs have produced evidence that requirements for riboflavin are variable and that this variation is linked with the gene responsible for black down color. In the tests, eggs containing black embryos did not hatch as well as those containing embryos with different colored down. The black embryos showed evidence of riboflavin deficiency. (Experiment Station Record)

FERTILITY, HATCHABILITY FACTORS STUDIED. *(Oregon's Agri. Prog. Through Res., 1950 Ann. Rpt., Sta. Bul. 491, November 1950,* p. 117).—Restricted mating of chickens under flock conditions apparently has no beneficial effect on fertility.

Some improvement in hatchability of eggs was noted when mating was restricted to afternoons, but it was not great enough to warrant the additional handling of the males.

In tests with White Leghorn females, it was demonstrated that age does not have a consistent influence on fertility as long as the females have been in production comparable lengths of time.

Results to date indicate that from November to March, cockerels fertilize a higher percentage of eggs laid by their mates than do the yearling cocks.

The rapid-comb-growth cockerels reach maximum sexual capacity—as measured by the percentage of fertile eggs produced by their mates in flock matings—at about 20 weeks of age. This was approximately two weeks ahead of the medium-comb-growth cockerels and four weeks ahead of the slow-comb-growth cockerels. After the males reached 24 weeks of age, there was no difference in the fertility of eggs from females mated to the three groups of males. (Experiment Station Record)

FEWER MALES NEEDED TO MAINTAN FERTILITY. *(Oregon's Agri. Prog. Through Res., 1950 Ann. Rpt., Sta. Bul. 491, November 1950,* p. 118).—Investigations with New Hampshires indicate that only six to seven males are necessary per 100 hens to maintain consistent high fertility of eggs. In many instances, three to five males gave good fertility. It was noted that a single male mated to approximately 100 hens fertilized 83 percent of the eggs laid in one trial and 73 percent in another.

With breeding flocks of White Leghorns, highest fertility was obtained with 5 males per 100 females. (Experiment Station Record)

SIRES INFLUENCE EGG QUALITY. *Res. for N. Mex. Agri., 60th Ann. Rpt., 1949,* p. 24).—The performance of the flock has shown that some males exert considerable influence on the albumen quality of eggs laid by their daughters.

Albumen is scored from 1 to 5, depending on its thickness. A score of 1 denotes top-quality, firm albumen. A score of 1, 1.5, and 2.0 would be graded either AA or A by commercial candlers. A score of 2.5 would be graded B.

In 1946, one male was found whose pullets produced eggs with good albumen regardless of the quality of albumen produced by their mothers. Descendants of this male were used in the breeding pens during 1947, and the pullets from these matings produced the highest average albumen score up to that time—1.7. (Experiment Station Record)

PHYSIOLOGY

BLATTNER, RUSSELL J., and ALICE POLK WILLIAMSON. ABNORMALITIES IN THE BEAKS OF DEVELOPING CHICK EMBRYOS; POSTMORTEM CHANGES WHICH MAY BE CONFUSED WITH DEVELOPMENTAL ANOMALIES. *A.M.A. Archives of Path. 50:* 676. 1950.—In normal chick embryos of 9, 10 and 11 days' incubation which have been killed and allowed to stand at incubator temperatures for eight to 16 hours after death, beak changes develop which may simulate those associated with developmental anomalies. These changes have been found in embryos dying of virus infection, in those dying after paraffin-coating of the shell, which interferes with respiration, in those dying as a result of hemorrhage from a clipped artery, decapitation and of unknown causes in the normal process of incubation. (Experiment Station Record)

CHAPMAN, D. G., W. A. MAW, and R. H. COMMON. *(McGill U., Montreal, Canada).* EFFECTS OF ESTROGEN AND ANDROGEN ON LIVER IRON OF THE IMMATURE PULLET. *Sci. Agric.* [*Ottawa*] 30: 194-200. 1950.—Four groups of sexually immature pullets (New Hampshire × Barred Plymouth Rock) were treated over a 12-day period with (1) nothing, (2) 6 mg. testosterone propionate, (3) 18 mg. estradiol benzoate and (4) 6 mg. testosterone propionate + 18 mg. estradiol benzoate, respectively. Estrogen alone significantly increased hepatic total iron and inorganic iron per kg. live wt. Estrogen + androgen gave significantly more hepatic total iron and inorganic iron than androgen only. Estrogen only gave significantly more total and inorganic hepatic iron per kg. live wt. than no treatment. Neither androgen alone nor estrogen + androgen gave hepatic iron contents significantly different from those of the untreated group. It is suggested that estrogen increases storage of iron in the fowl's liver while androgen decreases such storage. The hormonal treatments did not produce any significant differences in hepatic copper contents as compared with the control group or with one another.—*R. H. Common.* (Biological Abstracts)

COMMON, R. H., T. J. KEEFE, and W. A. MAW. SOME BIOCHEMICAL EFFECTS OF THIOURACIL ON THE RESPONSE OF THE IMMATURE PULLET TO ESTROGEN. *Canadian Jour. Res. 28:* 272, October 1950.—Estrogen increases the level of serum vitamin A; thiouracil depresses this effect. The general trend of the results for the total amounts of vitamin A in the livers in both experiments suggests that estrogen tends to increase liver storage of vitamin A and that thiouracil depresses this effect. (Experiment Station Record)

GRAU. ARTMERKMALE AM DARMKANAL UNSERER HAUSVOGEL. [SPECIES CHARACTERISTICS OF THE INTESTINAL TRACT OF OUR DOMESTIC BIRDS.] *Berliner u. münchener tierärztl. Wochenschr. 1943:* 176-179. 1943.—Detailed description with 5 drawings. —*J. J. Meier.* (Biological Abstracts)

HUMBLE, R. J., and J. S. GLOVER. EFFECT OF INTRAMUSCULAR INJECTIONS OF HEPARIN ON THE BLOOD CLOTTING TIME AND BLEEDING TIME OF CHICKENS. *Canadian Jour. Comp. Med. and Vet. Sci. 14:* 162-165. 1950.—Barred rock cockerels, 3.5 mos. old, were used for the expt. Intramusc. injns. ranging from 4.5 to 100 mg. were given. Only the birds receiving the largest dose showed a slight prolongation of bleeding and clotting times. This was not apparent when the birds were dressed for market a few days later.—*R. Gwatkin.* (Biological Abstracts)

LEVI-MONTALCINI, RITA. THE ORIGIN AND DEVELOPMENT OF THE VISCERAL SYSTEM IN THE SPINAL CORD OF THE CHICK EMBRYO. *Journ. of Morphology, 86:* 253, March 1950. (Experiment Station Record)

LORENZ, F. W. *(U. California, Berkeley.)* ESTROGENS FOR FATTENING POULTRY; TREATMENT OF CHICKENS ON INCREASE BUT IS NOT RECOMMENDED FOR TURKEYS. *California Agric. 3:* 11, 12. 1949.—Estrogen-treated cockerels temporarily develop feminine characters. These include, among others, thickening of the skin and faster fat formation. Both of these improve the appearance of the dressed bird. The meat is lighter in color and more tender and juicy. Pellets containing 15 mg. of pure diethylstilbestrol are implanted beneath the skin of young birds 6-8 wks. before killing. Larger dosages are required for adults. Turkeys fail to respond satisfactorily.—*G. W. Bohn.* (Biological Abstracts)

MELAMPY, R. M. *(U. Illinois, Urbana.)* CYTOCHEMICAL STUDIES ON THE CHICKEN ERYTHROCYTE. I. AMINO ACID CONTENT AND DISTRIBUTION. *Jour. Biol. Chem. 175:* 589-593. 1948.—The distribution of several amino acids in the nuclear and cytoplasmic proteins of the chicken erythrocyte was determined by use of microbiological assays. The total N content of chicken erythrocytes on a moisture-free lipid-free basis was 15.8% nitrogen and of the isolated nuclei, 12.5%. The avg. dry wt. of a single trythrocyte was 44.3×10^{-3} and of a nucleus 10.5×10^{-6}.—*Auth. summ.* (Biological Abstracts)

MONROE, ROBERT ADAMS. THE METABOLISM OF THYROXINE. *173p. Dissertation: U. Michigan, 1949.* Microfilm copy available from Univ. Microfilms, Ann Arbor, Mich., Pr. $2.17.—The review of literature includes sections on the alimentary absorption of the thyroid hormone, its biosynthesis, release from the thyroid gland, metabolic circuit, excretion, and destruction. Exptl. data are presented on absorption, excretion, and rate of disappearance of the thyroid hormone, with an additional section on the effect of feeding iodinated casein to hens on the thyroid size and metabolism of their chicks. Crystalline D,L-thyroxin fed at a level of approx. 0.000075% for 3 weeks was sufficient to maintain normal thyroid wt. in chicks simultaneously given 0.1% thiouracil. Comparable figures for the monosodium and disodium salts were 0.000035-0.00004%. No significant sex difference was noted. Thus, crystalline thyroxin was 20% and the salts 45% as effective orally as subcut. injns. of thyroxin in alkaline soln. From the level of desiccated thyroid necessary to perform the same task (0.009%), it was concluded that desiccated thyroid is about equally effective orally and parenterally. Iodinated casein fed to goats was calculated to be 78-88% absorbed. Of 100 mg. of thyroxin injd. into goats over a 10-day period, a maximum of 5% could be accounted for by excretion in the feces, as measured by the thyroidal activity of the feces (goiter-prevention assay in the chick). No thyroactive compound was excreted in the urine. Crystalline D,L-thyroxin fed for a week at a level of 0.00015% to thiouracil-treated female chicks disappeared in 2.5 days, as gauged by the time necessary for the subnormal thyroid wts. to return to normal under the influence of thiouracil. At the 0.0002% level, thyroxin did not disappear until 5 days after the cessation of thyroxin treatment. Increasing the dosage above this level did not prolong the duration of action of thyroxin. On the lower dosage level, female chicks metabolized thyroxin faster than the males, but at the 0.0002% level the duration time was the same for both sexes. Removal of half the liver did not affect the rate of disappearance of thyroxin, probably due to the rapidity of liver regeneration. Injn. of thyroxin directly into the spleen did not affect thyroxin disappearance, indicating that no appreciable amt. of thyroxin was destroyed in its first passage through the liver. Ca pantothenate in the feed hastened the disappearance of thyroxin; thiamin and niacin had the opposite effect. Vitamin A, riboflavin, and pyridoxine had no effect. Addition of vitamin B_{12} or fish meal to diets devoid of animal protein resulted in an increased rate of thyroxin disappearance, as compared with chicks on a vitamin B_{12}-deficient diet. Iodinated casein fed to hens caused an enlargement of the thyroids of their chicks. This enlargement was accompanied by decreased metabolic rate, as measured by the closed vessel technique. (Biological Abstracts)

OLSEN, MARLOW W., and RICHARD M. FRAPS. MATURATION CHANGES IN THE HEN'S OVUM. *Jour. of Experimental Zoology, 114:* 475, August 1950.—Microscopic examination of the germinal discs of mature ovarian follicles from both normally laying birds and those in which ovulation was induced experimentally revealed that the onset of maturation changes occurs approximately 4.5 hours before time of ovulation. In most ova the germinal vesicle had completely broken down and the first polar body had been extruded by at least 2.5 hours prior to time of expected ovulation. It is concluded that the same hormone which induces ovulation, either normally or experimentally, brings about the final maturation changes of the hen's ovum. This action, however, is not necessarily a direct one. (Experiment Station Record)

SPRATT, NELSON T. JR. NUTRITIONAL REQUIREMENTS OF THE EARLY CHICK EMBRYO. II. DIFFERENTIAL NUTRIENT REQUIREMENTS FOR MORPHOGENESIS AND DIFFERENTIATION OF THE HEART AND BRAIN. *Jour. of Experimental Zoology, 114:* 375, July 1950. (Experiment Station Record)

STAMLER, J., E. N. SILBER, A. J. MILLER, L. AKMAN, C. BOLENE, and L. N. KATZ. *(Michael Reese Hosp., Chicago.)* THE EFFECT OF THYROID- AND OF DINITROPHENOL-INDUCED HYPERMETABOLISM ON PLASMA AND TISSUE LIPIDS AND ATHEROSCLEROSIS IN THE CHOLESTEROL-FED CHICK. *Jour. Lab. and Clin. Med. 35:* 351-361. 1950.—Desiccated thyroid partially inhibits cholesterol-induced hypercholesterolemia and atherosclerosis in the chick. Hyperphospholipidemia and hyperlipemia of cholesterol feeding is also lowered. It decreases aortic cholesterolosis and is effective as a lipotropic agent against cholesterol-type fatty liver. Hypermetabolism-inducing dinitrophenol has little or no effect on plasma or tissue lipid levels and is ineffective prophylactically against cholesterol-induced atherosclerosis in the chick. In the chick cholesterol-induced atherosclerosis may develop with little or no increase in liver total cholesterol concn.—*P. A. Van Pernis.* (Biological Abstracts)

WOLKEN, JEROME J. EFFECT OF TEMPERATURE ON P^{32} TRANSPORT PHENOMENA IN FERTILE AND INFERTILE EGGS. I. *Jour. of Cellular and Comparative Physiology 36:* 271, October 1950.—Radioactive phosphorus was injected into the white of fertile, infertile and stored eggs, and the rates of transport were determined by the distribution of P^{32} in the shell, white, yolk and embryo at various incubation temperatures. P^{32} distribution in an inert system is fully predictable and the deviation constituted a measure of the metabolic activity.

It was found during the first five days of embryonic growth that: (1) there is a high rate of turnover between P^{31} and P^{32} in the developing embryo; (2) the P^{32} in the shell reaches a maximum concentration in 24 hours above 30°C. and then declines; (3) the approach to equilibrium is more rapid than in infertile eggs; (4) the processes appear to be mostly diffusive for the first 4 days of incubation and are then accelerated, especially in the temperature range of 30° to 41°C.; (5) the velocity rate constant is independent of temperature and a possible explanation is postulated for this behavior. (Experiment Station Record)

BIG BIRDS HIGH IN REPRODUCTIVE CAPACITY. *Oregon's Agri. Prog. Through Res., 1950 Ann. Rpt., Sta. Bul. 491,* November 1950, p. 125.—Eggs from hens with the wider breasts—more than 4½ inches—were less fertile than eggs from the narrower breasted hens, but the hatchability of fertile eggs was higher. . . . Narrow, medium, and wide breasted hens laid at about the same rate.

Body weight was not related to the number of eggs laid during the season nor to the number of poults produced per hen. (Experiment Station Record)

FAMILY DIFFERENCES IN FERTILITY NOTED. *Oregon's Agri. Prog. Through Res., 1950 Ann. Rpt., Sta. Bul. 491,* November 1950,

p. 124.—Family differences do exist relative to ease of fertilization and the length of time that fertility remains high. Several hens continued to lay fertile eggs throughout the 42-day period following the last insemination. (Experiment Station Record)

NUTRITION

ANDRUS, MARY, and M. X. ZARROW. *(Harvard U., Cambridge, Mass.)* AMOUNT OF ALKALINE PHOSPHATASE IN THE OVIDUCT OF FOLIC ACID DEFICIENT CHICKS. *Proc. Soc. Exptl. Biol. and Med. 72:* 714-716. 1949.—In normal and estrogen injd. white leghorn chicks, a folic acid deficiency induced by feeding a synthetic diet or the addition of 2% crude x-methyl folic acid to a normal diet markedly decreases the amt. of alkaline phopsphatase in the endometrium of the oviduct as detd. histochemically.—*Mary Andrus.* (Biological Abstracts)

BARABAS, E. *(State Exptl. Inst. Anim. Biol., Budapest.)* FOTT ES NYERS EXTRAHALT SZOJADARA ETETESENEK HATASA A CSIRKEK FEJLODESERE. [THE EFFECT OF FEEDING BOILED AND RAW EXTRACTED SOYBEAN MEAL ON THE DEVELOPMENT OF CHICKENS.] *Agrártudomány 1:* 402-404. 1949.—Chickens of Rhode Island, Hungarian peasant type and of no definable type were given for 6 weeks a feed consisting of 24.2% corn, 16.1 barley, 16.1 wheat and 11.3 oats (all of them ground), 8.1% alfalfa flour and 24.2% either cooked or uncooked soybean meal. The feed consumption averaged 1.6-1.8 kg. The mean wt. of chickens in the group given boiled soybean meal for 10-15 min. increased from 98 g. on the 3d week to 175, 298 and 497 g. on the 5th, 7th and 9th weeks. The comparable values for the group fed with unboiled (raw) soybean meal were 92, 123, 261 and 364 g. The growth of feathers was significantly faster and better in the 1st group than in the group fed uncooked meal. The good effect of the cooking meal is explained by the fact that cooking increased the digestibility of cystine or of other protein components of soybean.—*István Finály.* (Biological Abstracts)

BICKOFF, E. M., A. L. LIVINGSTON and N. S. SNELL. THE OCCURRENCE OF VITAMIN B_{12} AND OTHER GROWTH FACTORS IN ALFALFA. *Archives of Biochemistry 28:* 242, September 1950.—Microbiological assays for vitamin B_{12} in alfalfa using *L. leichmannii* as the test organism yielded total apparent vitamin B_{12} values ranging from 50 to 62 parts per billion (p.p.b.) for fresh alfalfa and from 12 to 45 p.p.b. for dehydrated alfalfa meal. The values obtained varied with sample size, the smaller the sample, the higher the apparent B_{12} activity.

Employment of differential assay techniques such as alkali digestion to destory B_{12}, inclusion of salt in the media which inhibits response to B_{12}, and paper-partition chromatography have indicated that more than 85% of the total apparent vitamin B_{12} activity is due to factors other than B_{12}. Chick assays indicate that the factors responsible for the apparent B_{12} activity in microbiological assays do not replace vitamin B_{12} for chick growth. (Experiment Station Record)

BIRD, FRANCIS H. MAGNESIUM DEFICIENCY IN THE CHICK.—I. CLINICAL AND NEUROPATHOLOGIC FINDINGS. *Jour. Nutrition 39:* 13, 1949.—The results of clinical and neuropathologic studies of magnesium deficiency in the growing chick have been presented.

Clinically, magnesium deficiency in the chick is characterized by poor growth and feathering, decreased muscle tone, squatting, ataxia, fine palpable tremors, progressive incoordination of movements, convulsions, and death.

A description is presented of the neuropathologic alterations which were found in the cerebellar Purkinje cells of magnesium deficient chicks. (Experiment Station Record)

BIRD, H. R. ANTIBIOTICS IN FEED. *Flour & Feed 51:* 18, November 1950.—There is no evidence that they are of value in the diets of breeding animals. Furthermore, feeding an antibiotic to breeding chickens does not benefit the progeny.

In most of the experiments the levels of antibiotic fed have been in the range of 10 to 20 milligrams per kilogram of feed. In experiments at Beltsville, there was no toxic effect when the diet contained 200 milligrams of streptomycin or 250 milligrams of aureomycin per kilogram.

Streptomycin is not readily absorbed from the digestive tract and hence should present no problem. Penicillin and aureomycin are readily absorbed, but are also readily metabolized and excreted. (Experiment Station Record)

BONDI, A., R. ETINGER, and H. MEYER. *(Agric. Res. Sta., Rehovot, Israel.)* THE PANTOTHENIC ACID CONTENT OF POULTRY FEEDING STUFFS. *Jour. Agric. Sci. 39:* 104-109. 1949.—The microbiological method of assaying pantothenic acid was modified and the acid was then detd. by its use for a large number of common poultry feeds which are assembled separately in tables as concentrates of animal, concentrates of plant origin and fresh plants used as poultry feeds. Drying was not found to cause variation in content where carried out at 70°C. The content of plants decreases as growth advances. Inversely, the dry matter content increases with growth. Feeds of animal origin were found to differ markedly; particularly fish meals. Many of the plant concentrates were quite rich in the acid. The release of the acid was variable for the plant concentrates, particularly in peanut oil cakes.—*Henry Dorsey.* (Biological Abstracts)

BOUCHER, R. V. KIND OF VITAMIN A LESS IMPORTANT TO CHICKENS THAN TO TURKEYS. *Science for the Farmer, 63 An. Rpt., Pa. Bulletin 529,* p. 33, July, 1950.—Turkeys utilize beta-carotene only one-fourth as efficiently as chickens while the two species utilize vitamin A acetate equally well. Thus, maximum performance may be expected when turkeys receive as little as one-fourth as much vitamin A in the form of acetate as when their requirement is provided in the pro-vitamin A form of beta-carotene. (Experiment Station Record)

CLARK, T. B., A. H. VanLANDINGHAM, and C. E. WEAKLY, JR. YOUNG GRASS-LEGUME SILAGE IN THE POULTRY RATION. *Bull. West Virginia Agric. Expt. Sta. 340.* 1-15. 1949.—Silage was made from immature oats, red clover, and alfalfa and preserved in steel drums. Equally good results were obtained when the silage was made with or without a preservative. A basal chick ration, deficient principally in riboflavin, produced slow growth and curled-toe paralysis even when supplemented with silage. Chicks reared in batteries from 2 to 6 weeks of age could not consume sufficient silage to overcome the deficiency. In trials with growing pullets, from 8 to 20 weeks, and using the same basal chick ration, addition of silage had no apparent beneficial effect except to prevent a possible deficiency in carotene. Egg production was not affected when silage was fed at the rate of 2.5 to 3 lbs. per 100 hens per day with a complete all-mash ration or with rations from which either or both alfalfa meal or riboflavin concentrate had been omitted. The egg yolks were slightly darker when silage was fed with the ration containing alfalfa meal. The silage feeding had no apparent effect on the percentage of blood spots. There was no relation between silage feeding and mortality in either the growing or laying trials. There was little or no indication that silage feeding had any effect on hatchability. The change in hatchability resulting when silage feeding was discontinued for four or more weeks in the summer months could not be attributed to the silage. Considering the labor involved in making immature silage and the experimental evidence showing little or no beneficial results from feeding the silage to chicks in batteries, to growing pullets and layers confined in pens, it is concluded that the poultry ration can be supplemented more efficiently by other vitamin carriers, especially for supplying riboflavin.—*Auth. summ.* (Biological Abstracts)

DAM, HENRIK. *(Polytech. Inst., Copenhagen.)* RELATIONSHIP OF VITAMIN E DEFICIENCY TO TISSUE PEROXIDES. *Ann. New York Acad. Sci. 52:* 195-199. 1949.—Exudates in chicks and brown coloration of the fat tissue in rats and chicks were caused by the feeding of vit. E-deficient diets containing a sufficient amt. of highly unsaturated fatty acids. The same applied to encephalomalacia in chicks. The development of exudates in the adipose tissue of chicks coincided approx. with the time when peroxides could be demonstrated in the depot fat. When brown coloration of the fat tissue occurred, the peroxide value of the fat was increased. A histochemical method for the demonstration of peroxides was applied to frozen sections of the brown adipose tissue of rats. Peroxidation of the fat always seems to precede and be a necessary stage in the formation of the brown pigment, but the pigment itself does not always show peroxidation. It is likely, therefore, that the pigment represents further stages of oxidation and polymerization of highly unsaturated fatty acids beyond the peroxide stage.—*Henrik Dam.* (Biological Abstracts)

FANGAUF, R. GEFLUGELZUCHT UND -FUTTERUNG. [BIRDS, REARING AND FEEDING.] *Forschungsdienst, Sonderheft 16,* 598-604. 1942.—Investigations on the minimum protein requirements of poultry have shown that a daily intake of 4 g. digestible protein per hen is sufficient to maintain a yearly egg production level of 180-200 eggs. Greater quantities are not economical. Expts. have also shown that the daily corn intake may be reduced from 50 g., ordinarily fed, to 30-40 g. if the decrease is balanced by higher intakes of meal-forage. Where optimum egg production is not necessary, corn can be further replaced by potato flakes, sugar beet chips, and industrial decay. The value of raw potatoes is very low. The value of fresh juicy forage (cabbage, turnips) and silage for poultry is not great; only about 30 g. daily could be fed; no sparing of the meal-forage could be obtained; number and wt. of the eggs were not increased, the amt. of the forage was decreased and neither the body wt. nor the breeding results were improved. Investigations with increasing intakes of fibrous substances in the forage showed an intake of 21 g. of fiber per hen per day to be optimum. With higher intakes of crude fiber, the egg production may not be diminished, but the value of the feed is reduced. The fiber-optimum, however, does not seem to be a constant value, but depends on the kind of protein-forage. Higher levels of fodder rich in fiber will be of value if it is not too bulky. A fiber percentage of 34 did not have an unfavorable effect on growing fattening poultry, but did decrease the value of the feed. Young geese can be fed greater quantities of fiber than can ducks. The egg production could be increased by the prepn. "H 505." Analysis of the effect of lighting on egg production showed that rays from incandescent light produce effects similar to those of spring sunlight: they bring about a stimulation of the sexual glands and simultaneously stimulate the whole organism for intensive reproduction. The lighting of breeding animals has never had an unfavorable effect on them or their progeny. Pigeons are superior to poultry in their utilization of protein and fat, but inferior in their utilization of crude fiber and N-free extract. Trials with forage rich and poor in protein (proportion 1:1.2 and 1:5.8) showed that the high protein content brought about only a small deviation of body wts. but not in the number of eggs or in the percent mortality as the daily forage consumption of the pigeons was maintained at 35-40 g. —*F. Schwanitz.* (Biological Abstracts)

GRAU, C. R. COTTONSEED MEAL FOR CHICKS. Expeller-type meal as produced in California can be fed at levels as high as 40% of the diet. *California Agriculture 4:* 14, September 1950.—Expeller-type cottonseed meal can be used extensively for chick-starting, broiler-fryer, and growing rations for chicks to provide the principal source of protein. Such rations should not be fed to laying hens, however, because of their adverse effect upon interior egg quality, particularly after storage. Under practical conditions, diets containing cottonseed meal probably need no amino acid supplements. (Experiment Station Record)

GRAU, C. R., F. H. KRATZER, and W. E. NEWLON. *(U. California, Berkeley.)* FEED FOR CHICKENS. *California Agric. Ext. Serv. Circ. 159.* 1-30. 1949.—This is a general discussion of the nutritional requirements of chickens, and of feedstuffs as sources of nutrients. Subject headings include energy sources; proteins; vitamins; minerals; water; diagnosing nutritional deficiencies; recommended nutrient allowances; feedstuffs as energy sources; protein concentrates; mineral sources; green feeds; harmful components of feedstuffs. A number of suggested formulas are tabulated. Other tables include: amino acid requirements; symptoms of nutritional deficiencies; recommended allowances; and composition of feedstuffs. Nutritional deficiencies are illustrated.—*C. R. Grau.* (Biological Abstracts)

HALVERSON, A. W., and E. B. HART. FACTORS AFFECTING THE STABILITY OF THE VITAMIN A FROM COD LIVER OIL IN CEREAL FEEDS. *Jour. Nutr. 40:* 415, 1950.—Vitamin A losses in both sealed and unsealed samples increased with temperature and length of storage.

The vitamin A of cod liver oil was more stable in ground white corn than in the mixed ration, under sealed and unsealed conditions and at similar storage temperatures.

The extremely rapid destruction of vitamin A induced by adding trace minerals (Fe, Cu, Co and Mn) to an unsealed white corn sample containing added cod liver oil was largely prevented by adding the minerals in a dried gelatin-mineral mixture rather than in free form. (Experiment Station Record)

HEUSER, G. F., L. C. NORRIS, M. L. SCOTT, and F. W. HILL. REQUIREMENTS OF POULTRY FOR PROTEIN AND AMINO ACIDS. *62nd Annual Report of the College of Agriculture at Cornell University and of the Cornell University Agricultural Experiment Station.* 1949. p. 184.—The results of the experiment showed no improvement in either growth rate or efficiency of feed utilization by increasing the dietary protein level about 20 percent. In fact, as the protein level was raised, the requirement for the unidentified factor(s) in fish meal was correspondingly increased. In the presence of an adequate amount of fish meal, the growth promoted by the three protein levels was practically identical. (Experiment Station Record)

HEUSER, G. F., L. C. NORRIS, M. L. SCOTT, and F. W. HILL. REQUIREMENTS OF POULTRY FOR PROTEIN AND AMINO ACIDS. *62nd Ann. Report of the College of Agriculture at Cornell University and of the Cornell University Agricultural Experiment Station.* 1949. p. 184.—Experiments have been conducted to determine the optimum protein levels for starting growing White Pekin ducklings. The results of these experiments indicate that a level of 19 percent protein is required for the first two weeks and that 16 percent protein is satisfactory from two weeks of age to market-age of eight or nine weeks.

The level of animal protein in the duck ration appears to be of importance not only for normal growth but also for maximum efficiency of feed utilization. The minimum amount of fish meal found to give optimum results in these respects was a level of 4 percent. However, in addition, for optimum feed utilization, 5 percent of dried skimmilk was also required. (Experiment Station Record)

KINDER, QUINTON B., and HARVEY STROTHMAN. RATIONS FOR GROWING CHICKS. *Res. for Farm & Home, Ann. Rpt. of Mo., Bul. 535,* p. 76, December 1949.—Omitting alfalfa leaf meal and supplementing the ration with crystalline riboflavin increased the net energy value of the ration, reduced the fiber content, and resulted in more rapid and economical gains.

Fish meal apparently was superior and provided a factor or factors that resulted in more rapid and efficient growth.

Inclusion of protomone in rations with a high animal protein factor did not increase growth rate and apparently decreased growth rate on the all vegetable protein ration. (Experiment Station Record)

KRATZER, F. H., BLANCHE MARSHALL, and D. E. WILLIAMS. *(U. California, Davis.)* POTATOES FOR POULTRY. VALUE OF DRIED POTATOES AS FEED FOR CHICKS AND POULTS INVESTIGATED. *California Agric. 3:* 10. 1949.—Raw potatoes, when sun-dried or oven-dried, are not a satisfactory feedstuff for growing turkeys or chickens. Dried cooked potatoes, fed at 40% of the ration, reduced growth and feed efficiency in poults.—*G. W. Bohn.* (Biological Abstracts)

MEI YU, DJU, MARY L. QUAIFE, and PHILIP L. HARRIS. *(Distillation Prod., Rochester, N. Y.)* UTILIZATION OF PURE α-, γ-, and δ-TOCOPHEROLS BY LAYING HENS. *Amer. Jour. Physiol. 160:* 259-263. 1950.—Laying hens, maintained on a vit. E-low diet, were fed supplements of pure alpha-, gamma-, or delta-tocopherols in amts. from 100 to 4000 mg./wk. The tocopherol content of eggs, blood, and feces from these hens was detd. by standard chemical methods. No evidence was found of conversion of gamma- or of delta-tocopherols to the alpha-form by the hen. The kind of tocopherol deposited in the egg was predominantly that which was fed. Large amts. of apparently unchanged, unabsorbed tocopherols were excreted in the feces. Hens used alpha-tocopherol most efficiently as indicated by efficiency of transfer to eggs and by concn. in the blood; gamma-tocopherol was about ¼ and delta-tocopherol only about 10% as effective as the alpha-form.—*P. H. Harris.* (Biological Abstracts)

NORRIS, L. C., G. F. HEUSER, and M. B. GILLIS. MINERAL REQUIREMENTS OF POULTRY. *62nd Annual Report of the College of Agriculture at Cornell University and of the Cornell University Agricultural Experiment Station.* 1949. p. 184.—Comparative tests have shown that properly processed defluorinated phosphates, dicalcium phosphate, and pure orthophosphates are of equal value as phosphorus supplements when used in chick rations at currently recommended levels.

Laying-hens have been found to utilize the phosphorus in the organic phytin complex less efficiently than they utilize inorganic phosphorus.

The metabolism of phosphorus by the growing chick has been found to be interrelated with that of potassium. The potassium requirement for maximum rate of growth is approximately 0.20 percent of the diet, but when the phosphorus content of the diet is suboptimum the potassium requirement may be as high as 0.24 percent. It has also been shown that adequate dietary potassium is necessary for bone calcification, maintenance of blood phosphorus levels and the efficient utilization of feed. (Experiment Station Record)

PETERSON, D. W. *(U. California, Berkeley.)* SOME PROPERTIES OF A FACTOR IN ALFALFA MEAL CAUSING DEPRESSION OF GROWTH IN CHICKS. *Jour. Biol. Chem. 183:* 647-653. 1950.—Concentrates which depressed the growth of young chicks were obtained by fractionating a hot water extract of alfalfa meal. The active principle was soluble in 50% and 80% ethanol and was largely precipitated from an aqueous alcohol soln. by the addition of acetone. The growth depressing action of inhibitory fractions and of alfalfa meal was largely counteracted by simultaneous feeding of cholesterol. The inhibitory concentrates had strong foaming properties in aqueous soln. and produced hemolysis of red blood cells. Boiling the inhibitory fractions with aqueous suspensions of cholesterol destroyed the hemolytic properties. The properties of the inhibitory fractions suggest that the growth depressing action of alfalfa meal is caused by the presence of saponins.—*D. W. Peterson.* (Biological Abstracts)

PREBLUDA, H. J. IN FEEDS AND NUTRITION, IT'S . . . THE FORTIFIED 50's. *Hatchery and Feed 24:* 16, November 1950.—The new method for the first time definitely defines the USP unit of Vitamin A in terms of specific weight. One USP unit is defined as 0.300 micrograms of Vitamin A alcohol, or 0.344 micrograms of Vitamin A acetate.

When carotene is dissolved in oil, and tested in poultry, against the activity of an alfalfa having a comparable provitamin A potency, it

was shown that the carotene content of eggs from hens fed alfalfa was much higher than that obtained from eggs of birds receiving the oil product. It has been suggested that alfalfa carries a factor which assists in the utilization of carotene.

Combinations of lecithin and Vitamin E have been reported to enhance the biological value of Vitamin A, in additon to protecting it from oxidative destruction. However, the stability of aqueous Vitamin A emulsions has been found to be greater than natural oils in combination with anti-oxidants such as Vitamin E and lecithin.

Not all feed ingredients can be digested and assimilated in the same manner. For example, it has been learned that the 10 essential amino acids found in beef scrap were 100 percent available, whereas, only 65 percent of the amino acid lysine was available in cottonseed meal.

When cobalt was given in deficient lambs in form of Vitamin B_{12}, it was not sufficient to correct the cobalt deficiency. From this work it is apparent that cobalt plays a more important role in the improvement of rumen bacteria in sheep and cattle than in providing Vitamin B_{12}. Its exact role is still not known. (Experiment Station Record)

QUICKE, G. V., and J. H. KELLERMANN. STUDIES ON INTERMITTENT INANITION IN THE FEEDING OF POULTRY. *Union S. Africa Dept. Agric. and Forest Sci. Bull. 282:* 1-28. 1947-48.—Fasting White Leghorn cockerels for 48-hrs. weekly over a period of 24 weeks had no significant effect on growth or mortality nor on the chemical composition of their breast and leg muscles. There was a saving of 10-17% in feed over the control group. Similar results were obtained with pullets but subsequent egg production was considerably reduced and onset of laying was retarded. Mortality of the fasted hens was also much higher. Green feed improved the condition of fasted pullets. An extensive bibliography is summarized.—*E. Mortensen.* (Biological Abstracts)

REISER, RAYMOND. FATTY ACID CHANGES IN EGG YOLK OF HENS ON A FAT-FREE AND A COTTONSEED OIL RATION. *Jour. Nutr. 40:* 429, 1950.—It is concluded that the hen cannot synthesize polyunsaturated fatty acids from non-fat precursors, but that it can synthesize 3, 4, and 5, but not 6, double bond acids from linoleic (two double bond) acid. (Experiment Station Record)

RICHARDSON, L. R., and L. G. BLAYLOCK. VITAMIN B_{12} AND AMINO ACIDS AS SUPPLEMENTS TO SOYBEAN OIL MEAL AND COTTONSEED MEAL FOR GROWING CHICKS. *Jour. Nutr. 40:* 169, 1950.—Soybean oil meal and a commercial cottonseed meal low in gossypol were investigated as the sole sources of protein for growing chicks. Soybean oil meal supported a normal rate of growth when it was supplemented with a vitamin B_{12} concentrate equivalent to 10 to 20 μg. of crystalline vitamin B_{12} per kilogram of diet. Cottonseed meal was equal to soybean oil meal when it was supplemented with vitamin B_{12} and 0.2% of L-lysine. Cottoonseed meal with lysine but without vitamin B_{12} gave a subnormal rate of growth, which showed that it was deficient in this vitamin. (Experiment Station Record)

SCHAEFER, A. E., W. D. SALMON, D. R. STRENGTH, and D. H. COPELAND. INTERRELATIONSHIP OF FOLACIN, VITAMIN B_{12} AND CHOLINE; EFFECT ON HEMORRHAGIC KIDNEY SYNDROME IN THE RAT AND ON GROWTH OF THE CHICK. *Jour. Nutr. 40:* 95, 1950.—Both folacin and vitamin B_{12} are required for maximum chick growth. When both are present in the diet, the resulting gain is an additive effect.

Under the experimental conditions reported in this paper vitamin B_{12} could replace folacin for hemoglobin production in chicks; however, slightly higher hemoglobin levels were consistently observed when both nutrients were present in the diet.

Both vitamin B_{12} and folacin in addition to choline are concerned in the prevention of perosis in the chick. A folacin deficiency produced a much higher incidence of perosis than a vitamin B_{12} deficiency.

The nutritional requirements of the chick and rat for folacin, vitamin B_{12} and choline are interrelated, and a specific requirement for one of these nutrients cannot be established unless the level of other two is taken into consideration. (Experiment Station Record)

SCHLAMB, KERMIT F., and REECE L. BRYANT. METHIONINE AND CHICK GROWTH. *N. D.'s Bimonthly Bulletin, XIII:* 67, Nov.-Dec. 1950.—The addition of synthetic d.l. methionine at the rate of 1.5 and 3.0 pounds per ton of feed to two practical types of starting and growing rations proved of no significant value. (Experiment Station Record)

SMITH, S. B., and W. H. WILEY. ARE PELLETED MILK BY-PRODUCTS WORTHWHILE? *Research for the Farmer, 62nd Annual Report of R. I., Contribution 763,* June 1950, page 11.—Two tests were run with Rhode Island Red pullets. One group was fed the pelleted milk by-products in addition to a good standard laying ration. The other group received the laying ration alone. After 6 months, the groups were reversed to try and eliminate pen variability. Records of production, hatchability and economy were taken and compared.

Hatchability of chickens getting the pellets seemed to increase over the other group, but production remained about the same. (Experiment Station Record)

SMITH, S. B. TURKEYS AND VITAMIN B_{12}. *Research for the Farmer, 62nd Annual Report of R. I., Contribution 763,* June 1950, page 12.—Hatchability, rate of gain, and rate of early feathering of turkeys weren't materially affected by injecting Vitamin B_{12} into the pre-incubated eggs in a series of recent tests.

S. B. Smith's work indicates that turkeys either have a low requirement for the vitamin or else the hen stores large amounts in the egg. (Experiment Station Record)

STOKSTAD, E. L. R., and T. H. JUKES. *(Amer. Cyanamid Co., Pearl River, N. Y.)* FURTHER OBSERVATIONS ON THE "ANIMAL PROTEIN FACTOR." *Proc. Soc. Exp. Biol. and Med. 73:* 523-528. 1950.—Fermentation products of *Streptomyces aureofaciens* were found to promote growth in depleted chicks on various diets which were adequately supplied with vit. B_{12}. Growth responses in chicks on a corn-soybean diet were also produced by crystalline aureomycin Hcl and by cultures in which the aureomycin, as measured by antibiotic potency, was destroyed by alkaline hydrolysis. Responses were also obtained with succinylsulfathiazole, streptomycin and 3-nitro-4-hydroxy-phenylarsonic acid, but these substances appeared less potent than aureomycin. No responses were obtained with dried whey or dried brewer's yeast.—*Authors.* (Biological Abstracts)

STURKIE, PAUL D. ABNORMAL ELECTROCARDIOGRAMS OF CHICKENS PRODUCED BY POTASSIUM DEFICIENCY AND EFFECTS OF CERTAIN DRUGS ON THE ABORNMALITIES. *Am. Jour. of Physiology, 162:* 538. 1950.—Forty-two chicks, 2 to 4 days of age, were fed a diet completely deficient in potassium. The chicks began dying after 10 days and most of them were dead within 21 days. Eleven died before ECG's were obtained. Among the chicks upon which ECG's were made, 19 revealed abnormal records.

Ten birds, 6 weeks of age, were also fed the K-deficient ration. All of them showed abnormal ECG's within 18 days and some as early as 10 days. (Experiment Station Record)

TOTTER, JOHN R., BARBARA KELLEY, PAUL L. DAY, and RAYMOND R. EDWARDS. THE METABOLISM OF GLYCINE BY FOLIC ACID-DEFICIENT CHICK LIVER HOMOGENATES. *Jour. of Biological Chemistry, 186:* 145. 1950.—Liver homogenates from folic acid-deficient and replete chicks were incubated with carboxyl-labeled radioactive glycine and the incorporation of the radioactive carbon into the proteins and phospholipides measured. Proteins and phospholipides

of the livers from deficient chicks were found to be only one-half to one-third as active as those from the folic acid-fed chicks.

The addition of folic acid *in vitro* was found to elevate slightly, but probably not significantly, the uptake of radioactive carbon from glycine. (Experiment Station Record)

TYLER, CYRIL, *(L. Reading, Eng.)* THE MINERAL REQUIREMENTS AND METABOLISM OF POULTRY. III. ELEMENTS OTHER THAN CALCIUM AND PHOSPHORUS. *Nutrition Abst. and Rev. 19:* 263-274. 1949.—This review deals with literature published from 1938 to 1948, with 123 citations. The elements discussed are Mn, with emphasis on perosis and the many factors involved in this nutritional disease; Fe and Cu; K, Na and NaCl; S, and Se. In evaluating exptl. reports, the author comments ". . . in experiments where there are no records of food consumption it is unwise to draw conclusions about liveweight gains . . . ," and, again "Some of the differences were large, but there was no statistical analysis of the data." Concerning sulfur, he concludes: "Thus, whatever the usefulness of sulfur against coccidiosis, it appears to increase the vitamin D requirements and, if these are not satisfied it will produce rickets in chickens and probably lead to disturbance of egg production in hens."—*H. H. Mitchell.* (Biological Abstracts)

WILLIAMS, J. N. JR., M. L. SUNDE, W. W. CRAVENS, and C. A. ELVEHJEM. THE INFLUENCE OF FOLIC ACID UPON ENZYME SYSTEMS IN CHICK EMBRYO LIVER. *Journ. of Biological Chemistry, 185:* 895. 1950.—The effects of folic acid upon xanthine oxidase, endogenous respiration, and choline oxidase activity of embryo liver from incubated eggs produced by hens either deficient in or given dietary folic acid have been reported. In addition the influence of folic acid upon embryo liver nitrogen and uric acid has been presented. Implications of the function of folic acid as a possible regulator or protein metabolism have been discussed. It appears from our data and also those of others that some of the most pronounced effects of folic acid occur early in the development of the embryo. (Experiment Station Record)

ANTIBIOTICS IN NUTRITION. *Flour & Feed, 51:* 10, October, 1950.—To date we know for chicks that streptomycin, penicillin, and terramycin will improve growth the same as aureomycin. There may be a difference in the quantity of these antibiotics required to give best growth but, nevertheless, they are all effective. Further it has been shown that phenylarsonic acid derivatives also give a stimulation in growth and some stimulation in growth has been noted when certain drugs used in the prevention of coccidiosis have been added to practical poultry rations.

In experiments over an 8-month period with breeding hens on built-up litter, we have found that the additions of an APF supplement containing aureomycin was no more effective for the breeding hen than was a supplement containing vitamin B_{12} but no antibiotic. (Experiment Station Record)

A.P.F. SUPPLEMENT REDUCES COST OF HIGH-EFFICIENCY BROILER RATIONS. *Agri. Res. in Idaho. Bul. 280. 57th Ann. Rpt.* July 1950, p. 14—Complete omission of all animal proteins is not advisable at the present time because of considerable variability in protein quality of soybean oil meal. The use of A.P.F. supplements is at the present time limited primarily to feed manufacturers. The supply is limited and, because of the small amounts needed, proper mixing into the complete feed is quite difficult. (Experiment Station Record)

CHICKEN NUTRITIONAL PROBLEMS INVESTIGATED. *Oregon's Agri. Prog. Through Res., 1950 Ann. Rpt., Sta. Bul. 491,* November 1950, p. 114.—The major limiting factor preventing the use of greater amounts of alfalfa meal in chick rations is an unidentified substance that can be removed with proper water treatment or inactivated with cholesterol. Indications are that commercial meal fed at the 20 percent level will support normal chick growth when the limiting factor is removed or counteracted. (Experiment Station Record)

CONTROL OF SELENIUM POISONING IN POULTRY. *Agri. Res. in S. D., 63rd Ann. Rpt.*, 1950, p. 123.—In previous years it has been demonstrated on breeding chickens that small amounts of arsenic in the drinking water will overcome the poisonous effects of selenized grains used in making up the diet.

Arsenic fed in the diet did not appear to have any effect in the control of selenium poisoning in turkeys. (Experiment Station Record)

CULL POTATOES TRIED AS TURKEY FEED. *Oregon's Agri. Prog. Through Res., 1950 Ann. Rpt., Sta. Bul. 491*, November 1950, p. 126.—Fresh or cooked cull potatoes were not utilized efficiently by growing turkeys in trials this year at the Umatilla Branch Experiment Station. The trials did indicate, however, that dehydrated cull potatoes might be used successfully. (Experiment Station Record)

EFFECT OF VITAMIN B_{12} ON THE RESPONSE TO HOMOCYSTINE IN CHICKS. *Archives Biochemistry 25:* 453, 1950.—Homocystine, with or without betaine, did not promote the growth of vitamin-B_{12}-deficient chicks on a diet deficient in methionine. However, these chicks responded to the addition of methionine. When supplemented with B_{12}, the chicks responded to methionine, homocystine, or homocystine *plus* betaine.

Vitamin B_{12} may be needed for the transformation of homocystine to methionine in chicks. Other functions for vitamin B_{12} in the nutrition of chicks are indicated by the observation that growth was more rapid on methionine *plus* B_{12} than on methionine alone, and by the finding (1) that vitamin B_{12} is needed for growth and survival of chicks on a diet of natural foods supplemented with methionine and choline. (Experiment Station Record)

FOLACIN REQUIREMENTS OF HENS. *Nutrition Reviews, 8:* 303, October 1950.—About 0.25 mg. of folacin per kilogram of ration was required for body weight maintenance. The data indicated that slightly more than this amount was needed for satisfactory egg production. Five-tenths milligram of folacin per kilogram of diet was sufficient for good hatchability, but 1.0 mg. per kilogram of diet was needed for storage of sufficient quantities of this vitamin in the egg to insure good livability of the offspring. (Experiment Station Record)

GRAY GETS BETTER BROILERS WHEN HE USES MORE GRIT. Georgia operator has figures to show that feed efficiency is increased where grit is fed, *and consumed. Hatchery and Feed 24:* 28, October 1950.—One early flock, using no grit, had an average of 30.4 pounds of meat per 100 pounds of feed (House No. 4, Farm 1).

Two of the later flocks, using the recommended feeding of granite grit, had 40.5 pounds of meat per 100 pound bag of feed (House No. 8, Farm 2).

Also using grit, House No. 1, Farm 2 showed 37.5 pounds of meat per 100 pound bag of feed.

His overall average for the four months, with grit, against four months without grit, showed an increase of about five pounds of meat per 100 pounds of feed. (Experiment Station Record)

INFLUENCE OF FEEDING AND MANAGEMENT UPON HATCHABILITY OF TURKEY EGGS. *Agri. Res. in S. D., 63rd Ann. Rpt.*, 1950, p. 123.—Eggs were set each week for 16 weeks and the results show that hatchability was not influenced by the source of riboflavin, and also that the presence of an A.P.F. supplement in the diet did not alter the hatchability to any great extent.

There may be some advantage in promoting rapid early growth of poults through the use of A.P.F. supplements in the turkey breeder diet, especially when the poults themselves are receiving a good diet. (Experiment Station Record)

LINK COBALT WITH B_{12}. *Hatchery and Feed 24:* 49, October 1950.—Cobalt, the mystery mineral of better nutrition, has been shown

in Fargo, North Dakota, to produce the same speed-up in the fattening of hogs as has been found in sheep and cattle. (Response in hogs is usually similar to chickens.)

Significant because swine have a different stomach system from ruminant animals, such as cows and sheep, experiments by four scientists at North Dakota Agricultural College have furnished a new link between cobalt and Vitamin B_{12}, and new evidence in the stepped-up study of the so-called "trace elements" in the food which animals—and humans—eat. (Cobalt is the central element in the vitamin B_{12}.) (Experiment Station Record)

NEW PRODUCT RIVALS APF. *Hatchery and Feed 24:* 32, October 1950.—A new product to assure uniform growth increases in livestock, and said to be as effective as Animal Protein Factor, was announced at the annual meeting of the American Chemical Society recently.

Three scientists of the U. S. Industrial Chemicals Inc., made the report.

The product is made by a primary fermentation process, which differs from other APF processes in that it is anaerobic. That is, it is produced by bacteria in the absence of air or oxygen.

The report points out that, since primary fermentation permits complete control of the process, it offers flexibility for the inclusion of other new and promising factors.

Another group of research workers from the laboratories of Hiram Walker & Sons, Inc., reported on a new fermentation process, which they said greatly increases the vitamin content and utility of distiller's byproduct feeds. (Experiment Station Record)

NEW VITAMIN CARRIER MEANS BETTER MIXING. *Hatchery and Feed 24:* 20, October 1950.—Refined corn meal of an improved type is the new carrier which is used for both 2,000-D and 4,000-D "Delsterol." The harder granules and more uniform particle size make possible greater precision in accurately dispersing it. This eliminates any tendency of the carrier to cake.

Like 2,000-D, the new formulation is used in several ways to fortify mashes. It may be placed directly in the feed mixer with other food elements, or it may be mixed with middlings, shorts, or other organic feed material before the final mixing. Or, it may, as preferred by some mills, be made into a D pre-mix, with other organic feed ingredients, excluding mineral elements. (Experiment Station Record)

NUTRITION AND FEEDING—EFFECT OF LYSINE ON TURKEY PLUMAGE. *Agri. Res. in Texas,* 1947-49, p. 158.—Rations low in the amino acid, lysine, cause Texas Broadbreasted Bronze turkeys to show plumage of poor quality and white feathers. (Experiment Station Record)

NUTRITIVE REQUIREMENTS OF HENS. *Agri. Res. in Texas,* 1947-49, p. 158.—In tests with growing turkeys, a ration made up of soybean oil meal and corn apparently did not need to be supplemented with any source of animal protein. (Experiment Station Record)

RELATIVE VALUES OF COMMON CROP VARIETIES FOR POULTRY RATIONS. *Agri. Res. in S. D., 63rd Ann. Rpt.,* 1950, p. 122.—Oats, when relatively cheap, can be fed to growing turkeys up to 67.5 per cent of the total diet without reducing the final weight of the birds at 28 weeks of age. (Experiment Station Record)

THE ANTI-ANEMIA FACTORS. *Jour. of the Am. Vet. Med. Assoc., CXVII:* 331, October 1950.—Thymine may replace large amounts of folic acid in the basic biologic processes of microorganisms. A study of the manner in which thymine and folic acid act to stimulate blood-cell formation suggests that this is through the synthesis of nucleic acid.

Vitamin B_{12} plays a role in the synthesis of thymidine and in that way probably produces its effect as an anti-anemia factor. One complica-

tion in this respect is that, although folic acid may be replaced by either thymine or thymidine, the vitamin B_{12} is replaceable only by the latter.

Folic acid is brought into direct interplay with vitamin B_{12} in anemia, probably through the key compound, thymidine, which is needed for the manufacture of nucleic acids for new cells, such as the new red blood cells, reticulocytes, etc. Folic acid facilitates the production of increased amounts of thymine. This in turn results in an increased production of thymidine. The latter step is probably assisted by the catalytic action of vitamin B_{12}. In general, it seems that the primary biochemical defect in pernicious anemia may well be the inability to synthesize nucleosides, particularly thymidine, from parent purines and pyrimidines.

Vitamin B_{14} was reported in January, 1949, as a new hematopoietic substance. While the discovery of its presence and activity does not solve the complex picture, it does serve to tie several loose ends together, notably, the interrelationships among folic acid, xanthopterin, and other factors. Among the latter may be the so-called "intrinsic" and "extrinsic" factors in pernicious anemia.—*Borden's Review of Nutrition Research, 10,* (Nov., 1949). (Experiment Station Record)

TURKEY HENS FED GREENS PRODUCE MORE LIVE POULTS. *Science for the Farmer, 63 An. Rpt., Pa. Bulletin 529,* July 1950, page 35.—The turkey hens fed the green feed supplement laid 130 eggs before the other hens started to lay. They also laid 127 more eggs for the season. The fertile eggs from these hens hatched 6.2 percent better, with 2.7 and 3.0 percent less dead germs and pipped eggs, respectively. (Experiment Station Record)

TURKEYS—LARGER AND MORE EFFICIENTLY PRODUCED WITH HIGH-ENERGY, LOW-FIBER RATIONS. *Agri. Res. in Idaho, Bull. 280. 57th Ann. Rpt.* July 1950. p. 17.—A comparison has been made of standard turkey starter and growing rations with starter and growing rations of considerably higher efficiency. This was accomplished by increasing the protein content from a standard level of 24 to 27.5 percent, reducing the fiber from 6.5 to 4.0 percent, and increasing the net energy content by using high levels of ground corn and omitting or reducing high-fiber feeds such as alfalfa meal, oats, barley, wheat, and millfeeds. The protein supplements used in the standard starter ration were fish meal 7.5 percent, meat meal 15, soybean oil meal 5, and corn gluten meal 5 percent. The high-efficiency starter ration contained fish meal 10 percent, meat meal 10, soybean oil meal 17.5, and corn gluten meal 5 percent.

The improved ration permitted more efficient production through increased body weight, more efficient feed utilization, and greater returns per bird over feed costs. (Experiment Station Record)

UTILIZATION OF PHYTIN BY CHICKS. *Nutrition Reviews, 8:* 317, October 1950.—From the presently reported study by the Cornell workers, it would appear that the chick differs from the rat in that it is unable to utilize phytin phosphorus effectively even in the presence of high levels of vitamin D.

Approximately two-thirds of the 0.6 percent of phosphorus in the diet must be in the readily available inorganic form for optimum early growth and normal bone calcification. (Experiment Station Record)

VITAMIN LACK KILLS HENS WHEN THEY START LAYING. *Science News Letter for August 26, 58:* 137. 1950.—It is not heart trouble that causes the non-infection deaths of hens about the time they start laying, but this loss to poultrymen may be linked to a deficiency of vitamin B_1 or potassium.

After a whole year of taking electrocardiograms of hens, which involved working out new methods, Dr. Paul David Sturkie, Rutgers professor of poultry physiology, found that heart ills killed only about 2½% of the normal hens, compared with about 25% deaths from unknown causes.

In another study, artificial diets lacking in vitamin B_1 and potassium did produce heart abnormalities in hens. Lack of vitamins A, D and G did not affect the heart, while too much potassium did.

Prof. Sturkie is now beginning a study of the blood pressure of hens as the next step toward solving the cause of this major loss in the poultry industry. Since the pulse rate of chickens is 300 to 400 a minute, too fast to count, electronic counting methods had to be developed. (Experiment Station Record)

WOOD MOLASSES PROMISING AS POULTRY FEED. *Oregon's Agri. Prog. Through Res., 1950 Ann. Rpt., Sta. Bul. 491,* November 1950, p. 115.—The tests show that 7½ percent wood sugar molasses may be used to an advantage in the laying ration but its use at the 15 percent level is questionable on the basis of efficiency of egg production.

In tests this year, substitution of wood sugar molasses at the 7½ percent level for ground grains resulted in a 4 to 5 percent increase in egg production. (Experiment Station Record)

PATHOLOGY

ANONYMOUS. TESTS DISINFECTED EGGS. *American Egg and Poultry Rev. 11:* 24. 1950.—Investigations on the effect of disinfectants on hatching eggs at the Bureau of Animal Industry, U.S.D.A., showed no noticeable effect on the hatchability of chicken eggs or turkey eggs. The solns. used were 2% NaOH, 1% Na orthophenylphenate and 0.1% quaternary ammonium disinfectant. The eggs were immersed for 5 min. in the soln. as a prevention to the spread of Newcastle disease from the shell surface.—*H. G. Lindquist.* (Biological Abstracts)

BEARD, DOROTHY, E. A. ECKERT, T. Z. CSAKY, D. G. SHARP, and J. W. BEARD. PARTICULATE COMPONENT OF PLASMA FROM FOWLS WITH AVIAN ERYTHRO-MYELOBLASTIC LEUCOSIS. *Proc. Soc. Expt. Biol. & Med. 75:* 533, 1950.—A particulate material has been isolated by ultracentrifugal procedures from the filtered plasma of chickens diseased with avian erythro-myeloblastic leucosis.

Material of this sort was not found in the plasma of either normal chicks or chicks refractory to infection with the blood or plasma from birds with avian leucosis. (Experiment Station Record)

BEAUDETTE, F. R. RECENT LITERATURE ON AVIAN PNEUMOENCEPHALITIS (NEWCASTLE DISEASE). *Vet. Med. XLVI:* 19, 1951.—It was concluded that carriers, if they exist at all in birds that have recovered from pneumoencephalitis, are so rare as to be "of no importance in view of the many more everyday sources of infection."

Thirty-four states request the use of vaccines. In 27 of these states, the regulations are administered by veterinarians, in four jointly by veterinarians and laymen, and in three by laymen. In nine states the use of vaccines is limited to veterinarians, in seven it is supervised by veterinarians.

From a long series of tests it was determined that duck plague, fowl plague, and pneumoencephalitis are unrelated diseases.

The importance of the airplane as a distributor of the Newcastle virus is indicated by the circumstance that the infection was transported to two countries during 1950, Holland and Venezuela, in shipments of birds by airplane. (Experiment Station Record)

BOLIN, F. M., and D. F. EVELETH. NEWCASTLE DISEASE OF TURKEYS. *Bimonthly Bulletin of the North Dakota Agr. Expt. Sta., Fargo, N. D., XIII:* 12, Sept.-Oct. 1950.—Reports discussing Newcastle disease in turkeys have been made by several investigators. The disease has often been confused with botulism, fowl cholera, erysipelas and coccidiosis. The different types of treatment for the different diseases shows the importance of getting a correct diagnosis.

Preliminary experiments conducted several years ago showed that the killed virus vaccine protected turkeys under field conditions of exposure. (Experiment Station Record)

BUSHNELL, L. D., and L. E. ERWIN. STUDIES ON NEWCASTLE DISEASE. IV. HEMAGGLUTINATION INHIBITION FOR NEWCASTLE DISEASE VIRUS BY NORMAL ALLANTOIC AND AMNIOTIC FLUIDS. *Transactions of the Kansas Academy of Science, 53:* 64, March, 1950.—The results obtained in these tests have demonstrated a slight hemagglutination inhibiting action by the allantoic and amniotic fluids from normal chicken embryos. As far as could be determined these eggs came from birds which had not had Newcastle disease. No attempt has been made to identify the inhibitory substance and it is not present in sufficient quantity in eggs from normal hens to be of much significance, although it might play a role in preventing the spread of the virus through hatching eggs. (Experiment Station Record)

BUSHNELL, L. D., and L. E. ERWIN. STUDIES OF NEWCASTLE DISEASE. V. RATE OF INCREASE OF NEWCASTLE DISEASE VIRUS IN THE ALLANTOIC SAC OF 10-DAY CHICKEN AND EMBRYOS. *Transactions of the Kansas Academy of Science, 53:* 66, March, 1950.—

1. The Newcastle disease type of virus increases rapidly in the allantoic fluids of 10-day embryos of the chicken.
2. It reaches its maximum amount approximately 36 hours after inoculation.
3. After this time there is a rapid decline in the total hemagglutinating virus in the allantoic fluid. The reason for this decrease is unknown.
4. This period corresponds to the time at which most of the embryos die of virus infection. (Experiment Station Record)

BUSHNELL, L. D., and L. E. ERWIN. STUDIES ON NEWCASTLE DISEASE. VI. THERMOSTABILITY OF NEWCASTLE DISEASE VIRUS AND ITS ANTIBODY. *Transactions of the Kansas Academy of Science, 53:* 68, March, 1950.—The thermal death point of Newcastle disease varies between 58° and 64°C. for a 30-minute exposure. Although 58°C. for 30 minutes reduced hemagglutination activity of these viruses to a marked degree, they were not completely destroyed under 64°C.

The antibody samples were not inactivated in any test below 68°C. for 30 minutes, while in some tests a temperature of 76°C. for 30 minutes was necessary to cause complete inactivation. (Experiment Station Record)

BUSHNELL, L. D., and L. E. ERWIN. STUDIES ON NEWCASTLE DISEASE. VII. THE RATE OF VIRUS ADSORPTION IN THE HEMAGGLUTINATION REACTION OF NEWCASTLE DISEASE VIRUS. *Transactions of the Kansas Academy of Science 53:* 378, September 1950.—

1. Rapid and complete adsorption of a strain of Newcastle disease virus by chicken red cells was recorded.
2. The maximum adsorption took place within 2.5 to 5 minutes after mixing the cells and virus.
3. The optimum concentration of red cells to give the most satisfactory reading lies between 0.5 percent and 2.0 percent. (Experiment Station Record)

BUSHNELL, L. D., and L. E. ERWIN. STUDIES ON NEWCASTLE DISEASE. VIII. REACTIVATION OF OVERNEUTRALIZED NEWCASTLE DISEASE VIRUS. *Transactions of the Kansas Academy of Science 53:* 381, September 1950.—

1. By means of heat-inactivated virus it was possible to reactivate a limited amount of Newcastle disease virus that recently had been artificially overneutralized with immune chicken serum or tissue extracts.

2. It was not possible to reactivate virus in the presence of tissue extracts obtained from recently recovered chickens, and high in antibody contents, by treatment with heat-inactivated virus. (Experiment Station Record)

DEARSTYNE, R. S., H. L. LUCAS, E. W. GLAZENER, and W. L. BLOW. WHEN NEWCASTLE STRIKES. *North Carolina Research and Farming IX:* 10, Autumn 1950.—After the disease had run its course production improved. In the case of the old birds it had returned to approximately normal in about six weeks. But in the case of the young birds, it had not returned to normal even after twelve weeks of observation.

Most of the eggs were unfit for marketing for about six weeks after the outbreak.

The following estimates assume a flock of 500 birds in their first laying year; feed prices of $90.00 per ton; hatching eggs at 72 cents per dozen; market eggs at 48 cents per dozen; and chick profits at two cents per chick.

For three months after the onset of the disease, the infected flock had an average rate of lay of about 30 percent. The 500-bird flock laid 13,500 eggs with 9,500 of them marketable. During the three months the birds consumed about 5.2 tons of feed at a cost of $461.00. The value of the eggs was $380.00—$81.00 less than the cost of the feed.

During the same 90-day period in previous years the birds had averaged from 60 to 65 percent production. They had consumed an average of 6.4 tons of feed at a cost of $575.00. They had produced 27,000 hatching eggs valued at $1,620, or a gross value of $1,045 above feed costs. (Experiment Station Record)

DELAY, P. D., and BERNARD KOCH. RESULTS OF PENICILLIN TREATMENT DURING AN OUTBREAK OF ERYSIPELAS IN TURKEYS. *Jour. of the Am. Vet. Med. Assoc., Vol. CXVII, No. 881,* August 1950, page 142.—Penicillin in wax failed to protect turkeys against natural infection with *Erysipelothrix rhusiopathiae.*

Of the birds given a simultaneous treatment of penicillin G potassium, 50,000 units, and penicillin in wax, 150,000 units, 80 per cent recovered.

Transmission to susceptible turkeys apparently resulted following exposure to affected birds in the same pen or when the affected and nonaffected birds were separated only by a wire fence. Birds in pens containing toms only became infected, while those in mixed pens, hens and toms, remained free from infection despite a similar opportunity for exposure.

Debeaking seemed to be of little value in preventing the spread of infection. (Experiment Station Record)

DOLL, E. R., M. ELIZABETH WALLACE, and WILLIAM H. McCOLLUM. INTERPRETATION OF SEROLOGIC PROCEDURES FOR THE DIAGNOSIS OF NEWCASTLE DISEASE. *Am. Jour. of Vet. Res., XI:* 265, July 1950.—(Experiment Station Record)

ERIKSEN, SIVERT. FOR MORE HEN HEALTH EFFICIENCY, 100% VACCINATION. *Hatchery and Feed, 24:* 15, July 1950.—Present losses from pox, tracheitis and Newcastle are inexcusable. We can do a much better selling job on health products. (Experiment Station Record)

GOLDSBY, ALICE I., and D. F. EVELETH. PSEUDOMONIASIS —A DISEASE OF POULTRY. *N. D.'s Bimonthly Bulletin, XIII:* 59, Nov.-Dec. 1950. (Experiment Station Record)

GRUMBLES, L. C., and W. A. BONEY, JR. INFECTIOUS SINUSITIS OF TURKEYS. *Vet. Med. XLVI:* 22, 1951.—Studies on egg transmission of sinusitis reached different conclusions, but the majority of investigators are of the opinion egg transmission does not occur.

The immunity developed by an attack of sinusitis is of a low order, easily overcome by intrasinus injection of virulent material, but is usu-

ally adequate to protect the birds from flock exposure. (Experiment Station Record)

HANAN, ROBERT. THE EFFECT OF TOCOPHERYL ESTERS ON INFLUENZA VIRUS. *Proc. Soc. Expt. Biol. & Med. 75:* 440, 1950.—Alpha-tocopherol esters are capable of inhibiting the enzymatic activity of influenza virus *in vitro* and of protecting chick embryos against infection by small doses of virus. A mixture of delta and gamma tocopherol esters was not effective. (Experiment Station Record)

HITCHNER, S. B., G. REISING, and H. VAN ROEKEL. INTRANASAL VACCINE: ITS ROLE IN AN AVIAN PNEUMOENCEPHALITIS CONTROL PROGRAM. *Vet. Med. XLVI:* 21, 1951.—The low virulence of the intranasal vaccine permits its use in day-old chicks and in laying birds, thus filling the gaps left by the other live virus vaccines.

Since none of the vaccines in present use is perfect and all have certain limitations, it is believed that a control program can be carried out more effectively by the use of a combination of immunizing agents. (Experiment Station Record)

JERSTAD, A. C., C. M. HAMILTON, and E. H. PETERSON. EXPERIMENTAL TRANSMISSION OF INFECTIOUS SINUSITIS OF TURKEYS. *Am. Jour. of Vet. Rec., XI:* 260, July 1950.—(Experiment Station Record)

KOUTZ, F. R. COCCIDIOSIS ORGANISMS SURVIVE WINTER EXPOSURE. *Ohio Farm and Home Res. 35:* 68, Sept.-Oct. 1950.—There are eight different types of coccidia that cause chicken coccidiosis, each causing a little different symptom in the chicken. There are four types of coccidia that are common in Ohio.

The experiments showed that the bloody cecal type of coccidiosis will survive a severe winter such as occurs in Ohio and will still cause the disease in young chicks placed on the soil the following spring.

The cecal type of coccidia was found to survive after 272 days during the fall, winter, and spring, but not after 322 days through fall, winter, spring, and part of the summer.

The experiments showed that mixed types of chicken coccidia will survive a severe winter, but the intestinal types of coccidia that cause chronic coccidiosis, with its emaciation and poor laying in older birds, were the only types still alive after a period of one year.

Sunlight does have a killing effect on all types of chicken coccidia as shown by the fact that two of the intestinal types did not survive in bare yards where there was no protection from grass or weeds. (Experiment Station Record)

LOOMIS, L. N., C. H. CUNNINGHAM, M. L. GRAY, and FRANK THORP, JR. PATHOLOGY OF THE CHICKEN EMBRYO INFECTED WITH INFECTIOUS BRONCHITIS VIRUS. *Jour. Am. Vet. Med. Ass'n. CXVII:* 412, November 1950.—Infectious bronchitis in naturally infected chickens is characterized by a short incubation period, rapid spread, and short duration. Typical symptoms reported by owners are sneezing, coughing, and respiratory rales. The gross lesions usually seen are accumulations of mucus in the lower trachea and bronchi, congestion and edema of the lungs, cloudiness of the air sac membranes with accumulations of cheesy material and, in young birds, facial swellings and nasal exudate.

The morbidity is high. (Experiment Station Record)

MATHEY, W. J., D. E. STOVER, and J. R. BEACH. ASIATIC NEWCASTLE DISEASE OUTBREAK CHECKED TO ELIMINATE POTENTIAL SOURCE OF LOSS TO POULTRY INDUSTRY IN CALIFORNIA AND NATION. *California Agriculture, 4:* 7, September 1950.—(Experiment Station Record)

MILLER, BARBARA RHODES, and ROBERT E. MILLER. DISTRIBUTION OF NEWCASTLE DISEASE VIRUS IN, AND ELIM-

INATION FROM, INTRATRACHEALLY AND INTRAMUSCULARLY INOCULATED BIRDS. *Jour. of the Am. Vet. Med. Assoc., Vol. CXVII, No. 882,* Sept. 1950, page 229.—From the limited data, it would appear that in the 4 intramuscularly inoculated birds, immunity developed so rapidly as to prevent a high concentration of virus in the trachea and, hence, there was no apparent spread to the contacts within the time allowed. On the other hand, virus introduced into the trachea was recoverable here in 2 birds from the first day through the fifth and sixth days, respectively, and from 2 birds from the second and third days respectively. It may be surmised that, in these latter 2 birds, the virus penetrated the respiratory epithelium sooner and did not reappear in quantities sufficient to be detected until multiplication and shedding took place, whereas the virus recovered on the first swabbing of the former 2 birds represented residual inoculum. (Experiment Station Record)

OLNEY, J. F. ACTINOMYCOSIS—A NEW DISEASE OF TURKEYS. *Veterinary Medicine, XLV:* 392, October 1950.—The symptoms of the disease were not particularly characteristic. However, in the early infection, the fecal discharges were thin and white in color. The ground occupied by the flock was conspicuously covered with white droppings. Birds surviving the early infection became weak and had a yellowish diarrhea for a week or ten days before death. There was no evidence of the sulfur colored droppings so commonly seen in blackhead.

When the disease was first observed, the livers were speckled with small pin point spots which soon developed into hard, well defined, rounded nodules, yellowish-white in color, resembling early tubercular lesions in the liver of a fowl. A few cases were observed without cecal lesions but the majority had very large ceca engorged with caseous cores somewhat resembling cecal coccidiosis of chickens. (Experiment Station Record)

OLSON, NORMAN O. A RESPIRATORY DISEASE (BRONCHITIS) OF QUAIL CAUSED BY A VIRUS. *Vet. Med. XLVI:* 22, 1951.—A respiratory disease, often fatal, occurred on the West Virginia State Game Farm among native bobwhite quail during the summer of 1949. The first hatch came off in April. Very little trouble was present from April to June, but by August 24, death losses of 80% were common.

Autopsy revealed no gross lesions except a thickening of the walls of the crop and cloudiness of the cornea in some, but not all, sick birds.

The symptoms were noted to be similar to those of infectious bronchitis or pneumoencephalitis in chickens. A virus was suspected as the cause of the disease.

Tests indicate that the virus isolated from quail is not the virus of avian pneumoencephalitis nor of infectious bronchitis. (Experiment Station Record)

O'SULLIVAN, P. J., and A. K. SUTHERLAND. COCCIDIOSIS OF POULTRY. *Queensland Agricultural Journal, 71:* 51, July, 1950.—Sulphaguanidine, sulphamezathine (= sulphamethazine), sulphamerazine, sulphapyrazine, and sulphaquinoxaline have proved effective for controlling caecal coccidiosis. Treatment is applied to minimize losses and yet permit relatively harmless infection so that the chickens develop immunity. Improper use of these sulphonamides may be costly and disappointing to the owner and harmful to the chickens, so recommended treatments should be followed carefully.

Sulphaguanidine is almost insoluble in water so it is given only in the mash. Treatment with 1 lb. per 100 lb. of mash suppresses the early forms of the parasite but it has little effect after the intestine has started to bleed.

Sulphamezathine and sulphamerazine are very effective for controlling outbreaks because they have their greatest effect on the stage of the parasite that causes bleeding. They have little effect on the sporozoites or the first non-sexual generation, so the infection is not completely suppressed and the birds can acquire immunity to the disease.

Sulphapyrazine and sulphaquinoxaline have been shown by overseas workers to be effective against coccidiosis but they are not yet available commercially in Australia.

Flowers of sulphur fed continuously in the mash at the rate of 2 percent from 4 to 10 weeks of age has been used as a preventative but this is not recommended because of possible harmful effects on growth and development of chicks.

Borax given in the mash at the rate of 2 percent or in the drinking water at the rate of 0.3 percent (i.e. ½ ounce per gallon) has some preventive but no curative action against coccidiosis. (Experiment Station Record)

PISTOR, WILLIAM J. BE ON GUARD FOR NEWCASTLE DISEASE. *Progressive Agriculture in Arizona, 1:* 8, Jan., Feb., Mar., 1950. —Potential dangers are ever-present in poultry areas of entire state. (Experiment Station Record)

PRIER, J. E. TREATMENT OF INFECTIOUS SINUSITIS OF TURKEYS WITH AUREOMYCIN. *Jour. of the American Vet. Med. Assoc., Vol. CXVII, No. 881,* August 1950, page 139.—Injection of 50 mg. of aureomycin into the sinuses eliminated the sinus swelling in 8 of 13 naturally infected birds.

Intramuscular injection of 100 mg. of aureomycin did not alter the symptoms or lesions in 17 naturally infected birds.

Intramuscular injection of 100 mg. of aureomycin into 11 experimentally infected birds failed to alleviate the symptoms or cure the disease. (Experiment Station Record)

QUINN, J. P. *(U. S. Dept. Agric., Beltsville, Md.)* NEWCASTLE AND EGG QUALITY. *Amer. Egg and Poultry Rev. 11:* 53. 1950.—A group of White Leghorn affected with Newcastle disease laid 192 eggs as compared with 198 eggs for an uninfected group of the same size; the egg wts. were 22.7 oz. and 24 oz. per dozen, respectively. When eggs were stored at 77°F. for 7 days, those produced by the previously infected pullets lost 2.83% against 3.24% for the normal. The candling score for the stored eggs was about one grade lower for the fresh eggs. The thick whites of fresh eggs from infected pullets held at 77°F. and 100°F. declined about 20% more than the thick whites of eggs from normal pullets. —*H. G. Lindquist.* (Biological Abstracts)

SCHLENKER, FRANK S., and BARBARA K. SIMMONS. THE ADSORPTION, DISTRIBUTION, AND EXCRETION OF SULFAQUINOXALINE IN POULTRY. *Am. Jour. of Vet. Res., XI:* 291, July 1950.—Sulfaquinoxaline accumulates more rapidly in chicken blood than do the more commonly used sulfonamides.

Sulfaquinoxaline diffuses into the egg in proportion to the blood concentration. (Experiment Station Record)

SMITH, S. B., W. H. WILEY, and J. P. DELAPLANE. SULFAQUINOXALINE. *Research for the Farmer, 62nd Annual Report of Rhode Island, Contribution 763,* June 1950, page 11.—Feeding sulfaquinoxaline in mash is known to help prevent the spread of the respiratory form of fowl cholera.

S. B. Smith, W. H. Wiley and J. P. Delaplane fed a group of normal birds sulfaquinoxaline at the recommended dosage level of 1:3,000 for a period of time. One group received the drug with the laying ration while another received only the unmedicated ration.

The records kept showed only a small difference in production and hatchability between the pens. This difference could easily have been due to chance variations between the pens. From this, the researchers feel that there is no harmful effect in feeding the drug. (Experiment Station Record)

TENNISON, L. B., C. BOTTORFF, and FLOYD MARKHAM. INTRANASAL AVIAN PNEUMOENCEPHALITIS VACCINE AND ITS

USE. *Vet. Med. XLVI:* 20, 1951.—Passively immune birds respond satisfactorily to intranasal vaccination against pneumoencephalitis (Newcastle disease). (Experiment Station Record)

VAN ROEKEL, H., K. L. BULLIS, G. H. SNOEYENBOS, M. K. CLARKE, and O. S. FLINT. SIGNIFICANT OBSERVATIONS IN PULLORUM DISEASE ERADICATION. *Vet. Med. XLVI:* 18, 1951.—Eradication of pullorum infection from breeding flocks may be accomplished through short-interval testing.

The number of tests required depends upon several factors: (1) reliable testing method, (2) percentage of infection, (3) size of the flock, (4) environmental conditions, (5) adoption of a sound sanitary program, and (6) cooperation of the owner. Of these, the first is the most important. (Experiment Station Record)

WILSON, WILBOR O. *(U. California, Davis.)* CANNIBALISM IN POULTRY; CAUSES OF PROBLEMS COMPLEX AND PROBABLY INVOLVE NUTRITION, GENETICS, AND MANAGEMENT. *California Agric. 3:* 13, 16. 1949.—Study of this problem is hindered by the inability to induce cannibalism in tests of suspected factors. Control practices are discussed.—*G. W. Bohn.* (Biological Abstracts)

ZARGAR, S. L., and B. S. POMEROY. THE EFFECTS OF COMMERCIAL LIVING NEWCASTLE DISEASE VIRUS VACCINES. *Am. Jour. of Vet. Res., XI:* 272, July 1950.

1. Following vaccination, the birds showed clinical signs of ND which were indistinguishable from natural outbreaks.
2. A fall in egg production as a sequel to ND vaccination was a constant feature.
3. A drop in egg production was associated with the production of off-color, malformed, and soft-shelled eggs.
4. The Newcastle disease virus (NDV) was found in the yolk of 68.8 percent of the eggs laid two to ten days after vaccination.
5. The NDV isolated from the eggs was pathogenic for susceptible chickens.
6. The NDV was also recovered from the feces and egg shell washings of vaccinated birds. (Experiment Station Record)

A RARE CYSTIC OVARY. *Queensland Agricultural Journal, 71:* 50, July, 1950.—A cystic condition of the ovary in hens is only occasionally seen, and as a general rule there is very little increase in size. The bird shown here found it necessary to rest after walking a few yards. When walking, the body was carried at an angle of about 60 degrees, the legs being forced very wide apart and the abdomen almost touching the ground.

The weight of the carcass after removal of the cystic ovary was 3 lb. 15 oz. and the cystic ovary weighed 2 lb. 3oz. The hen was in well fleshed condition and between two and three years of age. (Experiment Station Record)

COCCIDIOSIS IN CHICKENS. *Agri. Res. in Texas,* 1947-49, p. 177.—Methyl bromide fumigation of litter artificially contaminated with coccidia prevented an acute outbreak of the disease. A high mortality occurred on litter artificially contaminated with coccidia and not fumigated. (Experiment Station Record)

CORNELL SAYS LEUCOSIS NOT SPREAD THROUGH EGG. *Hatchery and Feed 24:* 39, October 1950.—Cornell research during two years past shows that (1) it is very unlikely that the disease is transmitted through the egg; (2) any such transmission that may occur is of no significance whatever in practical control of leucosis, and (3) the all-important factors are the degree of exposure after hatching and the genetic constitution of the birds.

(Editor's Note: This would be good news for hatcheries if it were not for the fact that the Regional Research Laboratory (East Lansing, Mich.) holds to a somewhat different theory and has strong support for

their conclusions. We will be glad to explain these differences to interested readers or we may discuss them in an editorial next month.—S.L.A.) (Experiment Station Record)

DEMAND FOR FOWL TICK FEVER VACCINE. *Agricultural Gazette of New South Wales LXI:* 222, April 1950.—Demand for vaccine against fowl tick fever (spirochaetosis) is steadily increasing, reports the Director of Veterinary Research at the Department of Agriculture's Veterinary Research Station, Glenfield.

Last spring some thousands of doses of this vaccine prepared in 1948 were on hand, and these have all been issued to veterinary officers in the field. (Experiment Station Record)

EGG PRODUCTION AND HATCHABILITY NOT IMPAIRED BY COCCIDIOSIS. *Science for the Farmer, 63 An. Rpt., Pa. Bulletin 529,* July 1950, page 35.—Body weights of birds recovered from cecal coccidiosis were slightly less than the chickens given the sulfaquinoxaline treatment. Contrariwise, the sulfaquinoxaline had no harmful effect on hatchability or egg production. The data further suggests that sulfaquinoxaline fed continuously at a (0.0125%) level may have a beneficial effect on body weights of chickens. (Experiment Station Record)

INFECTIOUS SINUSITIS OF THE TURKEY. *Agri. Res. in Texas,* 1947-49, p. 178.—Preliminary results indicate that both streptomycin and aureomycin are effective against this infection when injected into the affected sinus. (Experiment Station Record)

POULTRY COCCIDIOSIS. *Texas Farming and Citriculture, XXVII:* 11, Sept. 1950.—At least 75 percent of the deaths that occur in broiler flocks and 60 percent of the losses in farm flocks before they reach market or production age, are caused by disease. In outbreaks of coccidiosis death losses may approach almost 100 percent; however, possibly less than half the flocks in which outbreaks occur have losses as high as 10 to 20 percent, while many flocks are raised without death losses from coccidiosis. These facts lead to a rough estimate that about 10 percent of death losses in young birds can be attributed to coccidiosis (conservatively estimated at $5,000,000). (Experiment Station Record)

POULTRYMEN PROFIT FROM DISEASE CONTROL. *Oregon's Agri. Prog. Through Res. 1950 Ann. Rpt., Sta. Bul. 491,* November 1950, p. 121.—Earlier studies on fowl pox control were substantiated by work which indicates that baby chick vaccination is highly effective as a means of controlling the disease.

A disease sometimes called "blue comb" appeared in several Oregon chicken flocks this year. The most effective treatment devised was irrigation of the crop and filling it with water. Feeding supplements that encourage water consumption, such as milk mash or molasses, also was found helpful in aiding recovery since affected birds are in a dehydrated condition. (Experiment Station Record)

POULTRY PRODUCTS AND MARKETING

BROWN, HELEN J., and N. E. GIBBONS. ENTEROCOCCI AS AN INDEX OF FECAL CONTAMINATION IN EGG PRODUCTS. *Canadian Jour. Res. Sect. F. Technol. 28:* 107-117. 1950.—Enterococci were present in all samples of liquid and frozen eggs products examined. They survived spray drying and storage in egg powder better than the coliforms and *Escherichia coli* and are therefore considered a better index of fecal contamination. There was no relation between the occurrence of *Salmonella* organisms and the number of enterococci present. *Streptococcus faecalis* was the species most commonly found. The addition of 0.5% yeast extract to SF medium reduced the number of false

negatives and improved the sensitivity, although confirmation on agar was still necessary. Winter and Sandholzer's medium, with bromocresol purple as indicator, could be used without confirmation but was not as sensitive for products containing small numbers of enterococci.—*Auth. abst.* (Biological Abstracts)

DYSON, ROSE, and N. E. GIBBONS. THE EFFECT OF OILING AND AIR CELL MOLD ON THE OXYGEN AND CARBON DIOXIDE CONTENTS OF THE AIR CELLS OF EGGS. *Canadian Jour. Res. Sect. F. Technol. 28:* 101-106. 1950.—The gas contained in the air cells of day-old eggs had a high CO_2 content, but during storage the gas composition approached that of the surrounding atmosphere. Oiling of the egg, or otherwise sealing the shell, tended to retain CO_2 in the air cell. Growth of mold in the air cell, or of bacteria in the egg contents, markedly reduced the O_2 content and increased the CO_2 content of the air cell gas. Permeability of the shell of unoiled eggs to moisture vapor was low and the relative humidity in the air cell was shown to be 99% or higher. Oiling of the eggs cannot therefore promote mold growth by increasing the humidity in the air cell.—*Auth abst.* (Biological Abstracts)

FORSYTHE, RICHARD H., and JOSEPH F. FOSTER. *(Iowa State Coll., Ames.)* EGG WHITE PROTEINS. I. ELECTROPHORETIC STUDIES ON WHOLE WHITE. *Jour. Bipl. Chem. 184:* 377-383. 1950.—Procedures have been developed whereby it is possible to analyze egg white electrophoretically at pH 7.8 without removal of the ovomucin. The various protein components have been tentatively identified but ovomucin does not manifest itself in the patterns. Under the conditions imposed, the protein composition of egg white is: ovalbumin 64.9%, ovomucoid 9.2%, globulin 8.7%, conalbumin 13.7%, and lysozyme 3.4%. The electrophoretic mobilities of the protein constituents were found to decrease linearly with increasing ionic strength. Statistically significant differences were demonstrated in the protein composition of egg white from 6 genetic strains of chickens. Principal differences were in the globulin components.—*R. H. Forsythe.* (Biological Abstracts)

FORSYTHE, RICHARD H., and JOSEPH F. FOSTER. *(Iowa State Coll., Ames.)* EGG WHITE PROTEINS. II. AN ETHANOL FRACTIONATION SCHEME. *Jour. Biol. Chem. 184:* 385-392. 1950.—The fractionation scheme employed for the large scale prepn. of the plasma proteins has been successfully adapted to the egg white protein system. All of the major protein constituents of egg white have been prepared in purified form. Isolation of ovomucin was accomplished by subjecting blended egg white to high speed centrifugation. This results in little alteration of the protein and substantiates the view that ovomucin exists as large (fibrillar) particles in egg white. The presence of 2 globulins in egg white is indicated on the basis of solubility characteristics. The results suggest that riboflavin may not be bound to the main conalbumin component. Ovalbumin prepared by these procedures is readily crystallized by the use of ammonium sulfate.—*R. H. Forsythe.* (Biological Abstracts)

FUNK, E. M., JAMES FORWARD, and MARTHA LORAH. THERMO-STABILIZATION OF SHELL EGGS. *Res. for Farm & Home, Ann. Rpt. of Mo., Bul. 535,* p. 74, December 1949.—In applying this process commercially some spoiled eggs were found after 6 to 8 months storage. Such loss was less than in eggs not stabilized, but there occurred an occasional spoiled egg in lots of stabilized eggs moving through the regular channels of trade.

Preliminary tests have been made with a bacteria, *Serratia rosea,* which causes spoilage in shell eggs, but is not killed by thermo-stabilization. These preliminary results showed that stabilized eggs cooled soon thereafter keep much better than those which remained warm for 24 to 48 hours after stabilizing. Thus, if stabilized eggs were cooled soon after processing occasional spoiled eggs were prevented. (Experiment Station Record)

GIBBONS, N. E. PRESERVATION OF EGGS. VII. EFFECT OF AGE OF EGG AND CARBON DIOXIDE CONTENT AT TIME OF OILING ON KEEPING QUALITY. *Canadian Jour. Res. Sect. F. Technol. 28:* 118-127. Illus. 1950.—The quality of eggs oiled when one day old is maintained better than that of eggs oiled when 6 or 10 days old, the ages between which most commercial eggs are treated. If the pH of the albumen of the older eggs is lowered by exposure to CO_2 before oiling (a simple method of treating eggs with CO_2 is described), the keeping quality as measured by yolk index, albumen height, and percentage of thick albumen is improved. However, these differences are not apparent on candling, and on this basis the improvement does not justify the added cost of the gassing treatment.—*Auth. abst.* (Biological Abstracts)

GINSBERG, ALFRED. POULTRY-KILLING AND PROCESSING. *East African Agri. Jour. of Kenya, Tanganyika, Uganda and Zanzibar XVI:* 59, July 1950.—Before killing, the birds, similarly to other animals should be kept without food for 12 to 18 hours. To avoid shrinkage water should be given in plenty and it is advisable to keep the fowls in a comfortable place which is neither excessively hot nor cold.

Although scalding is a substantial time saver, it may do a lot of harm to the carcasses if not properly carried out. Temperature of the water should be maintained between 125°F. to 129°F. for chickens and turkeys. Ducks and geese require between 175°F. to 190°F.

The plucking of the bird should take place about half a minute after scalding.

The singeing of the bird should be carried out after all the pin feathers have been removed. (Experiment Station Record)

GORESLINE, HARRY E., ROY E. MOSHER, JR., and KIRBY M. HAYES. A PILOT SCALE STUDY OF SHELL EGG THERMOSTABILIZATION. *Food Tech. IV:* 426, 1950.—Thermostabilized eggs retained their interior quality during storage to a better degree than "natural" or "oiled" eggs, as demonstrated by the candling procedure.

The percentage of thick white was greater in stabilized eggs than in "natural" or 'oiled" eggs after 4, 5, and 8 months of storage.

The whipping properties of egg white were altered by the stabilization process. A marked increase in whipping time was necessary to obtain foam of a value comparable to that of untreated eggs.

Thermostabilization had no marked influence on the yolk index. There was a slight increase in the index, but not enough to be of significance. (Experiment Station Record)

GWIN, JAMES M. THE SUB-SCALD METHOD OF DRESSING POULTRY. A Discussion of Some of Its Possibilities and Some of Its Limitations as Digested from a Presentation at this Year's Poultry Science Meeting. *Am. Egg & Poultry Review, 11:* 8, November 1950.—The sub-scald method of dressing poultry consists of immersing the birds in water that is not over 140°F. for a period of approximately 30 seconds. This temperature loosens the feathers considerably more than they would be loosened by the conventional semi-scald method that uses temperatures of between 127° and 130°F.

Unfortunately, the sub-scald method is not suitable for New York, or blood and feather, dressed birds because it breaks down the structure of the outer layer of skin so that the most of this layer is removed by the picking machine. This outer skin is known technically as the cuticle or epidermal layer. It does not carry nerve fibers or blood vessels, but it does contain most of the yellow pigment of the skin. As a result, its removal leaves the birds uniformly light and with a very clean appearance. (Experiment Station Record)

KAHLENBERG, O. J., M. M. LALLY, and J. M. GORMAN. WHAT'S THE BEST WAY TO SAMPLE FROZEN EGGS? PART II. *U. S. Egg & Poultry Mag. 57:* 14, 1951.—The present procedure for drilling frozen eggs for shavings does not give a representative sample for analysis. The shavings consistently showed higher solids values than the liquid or frozen controls.

In all cases, the liquid samples taken at the churn showed higher bacterial counts than shavings did when they were analyzed after holding periods of three days or more. These variations were noted in different areas of the same container.

If commercially practical, one of the best methods of sampling would be to thaw a 30-pound can of product taken from a well-mixed churn representing a certain number of cans in the lot. (Experiment Station Record)

LARZELERE, H. E., and C. C. SHEPPARD. CHANGES IN EGG QUALITY AS INFLUENCED BY A COMBINATION OF FACTORS. *Michigan's Quarterly Bulletin, 33:* 44, August 1950.—In order to relate the quality change more readily to the differences in various factors, the same point system as used in the regional study was adopted. In brief, 1 point decline indicated that 1 egg in 100 had gone down one grade. It was determined that there was a decline of 10.5 points between the buying station and the central plant. Of this decline 7.2 points were determined to be due to changes in interior quality and 3.3 points to shell damage.

Four factors which individually seemed to be related to the amount of change in interior quality were as follows:

1. The number of days between grading at the buying station and at the central plant.
2. The case temperature at the country buying station.
3. The percentage of grade A eggs at the country buying station.
4. The outside temperature at the time of grading at the country buying station. (Experiment Station Record)

LEWIS, J. C., N. S. SNELL, D. J. HIRSCHMANN, and HEINZ FRAENKEL-CONRAT. AMINO ACID COMPOSITION OF EGG PROTEINS. *Jour. of Biological Chemistry, 186:* 23, 1950.—Amino acid and other analyses are presented for the following egg proteins: crystalline lysozyme, electrophoretically homogeneous conalbumin and ovomucoid, and the less pure proteins, avidin, phosvitin, and vitellin. Analyses are also presented for the following crystalline reference proteins: B-lactoglobulin, chymotrypsinogen, bovine serum albumin, and egg albumin; and the microbiological assay methods used are described. (Experiment Station Record)

SMYTHE, C. A. EGG PULPING UNIT GAINING FAVOR WITH AUSTRALIAN BREAKERS. *Am. Egg & Poultry Review 11:* 38, 1950. (Experiment Station Record)

TERMOHLEN, W. D. POULTRY GRADING AND INSPECTION PROGRAM OF THE U. S. DEPARTMENT OF AGRICULTURE. *Vet. Med. XLVI:* 23, 1951. (Experiment Station Record)

EFFECT OF NEWCASTLE DISEASE ON EGGS IN STORAGE. *Agri. Res. in Texas,* 1947-49, p. 157.—A study of the effects of Newcastle disease on the quality of market eggs, both fresh and after storage, showed that both the albumen and shell quality are affected. The eggs grade lower and greater storage losses occur in eggs from Newcsatle-infected hens. (Experiment Station Record)

WHAT TO CHARGE FOR DRESSED BIRDS. *Farm Journal,* January 1951, p. 55.—Suppose you're selling oven-dressed birds, ready to cook. How much extra should you add on, over the price of a New York dressed bird (one that's just minus its feathers and blood)?

Here's the basic fact to start with: your bird's weight shrinks another 22% as you complete the dressing.

Some dressing plants take the New York dressed price, add 22% for shrink, and 5½¢ a pound for labor. Others simply price oven-dressed birds 40% higher than New York dressed birds.

Take a 50c-a-pound New York dressed price. The first way you get 66¼c, the second way you get 70c. (Experiment Station Record)

MANAGEMENT

BAROTT, H. G., and EMMA M. PRINGLE. *(U. S. Dept. Agric., Beltsville, Md.)* EFFECT OF ENVIRONMENT ON GROWTH AND FEED AND WATER CONSUMPTION OF CHICKENS. III. THE EFFECT OF TEMPERATURE OF ENVIRONMENT DURING THE PERIOD FROM 18 TO 32 DAYS OF AGE. *Jour. Nutrition 11:* 25-30. 1950.—Chickens were housed in a controlled environment without a hover for the first 32 days after hatch to determine the optimum temp. for growth and efficiency of feed utilization from the 18th to the 32d day. 31 expts. were performed using 30 chickens for each expt. The temp. during the first 18 days was that previously found to be optimum, 94-95°F., the 1st day and dropped uniformly to 80°F. on the 18th day. For the period from the 18th to the 32d day the temp. varied with different lots of chickens from 80°F. on the 18th day to from 76° to 55°F. on the 32d day. Max. growth was found when the temp. fell uniformly from 80°F. on the 18th day to 66°F. on the 32d day. The efficiency of feed utilization decreased from a value of 0.49 on the 18th day to 0.38 on the 32d day. Approx. 1.75 g. of water was drunk for every gram of feed eaten.—*Auth.* (courtesy Wistar Bibl. Serv.)

BRANN, V. H. COCKEREL RAISING IN BATTERIES. *Agricultural Gazette of New South Wales LXI:* 213, April 1950.—The spectacular development of cockerel raising as a commercial venture is one of the highlights of post-war progress in the poultry industry. Prices have been firm continuously and the higher values obtained for prime chickens have kept pace with the ever-rising costs of production on a market that is free from control. It is not surprising, therefore, that inquiries are received regularly regarding the stability of this new industry. Newcomers, and not a few farmers who have switched partly or wholly from egg production, are all seeking information.

There is still a world shortage of meat and the stock feed resources of Australia should permit further expansion of table poultry raising, provided attention is paid to the quality of the birds produced and the methods of processing and packing them for export trade. (Experiment Station Record)

BRANN, V. H. COCKEREL RAISING IN BATTERIES. *Agri. Gazette of New South Wales, LXI:* 269, May 1, 1950. (Experiment Station Record)

EGGLETON, L. Z. HOW CAN MIDWESTERN FARM POULTRY RAISERS ADJUST TO FIT THE CHANGING MEAT PRODUCTION PATTERN? *U. S. Egg and Poultry Mag., 56:* 12, October 1950.—For most farm flock-owners that will mean selling cockerels direct from the brooder house at eight to 12 weeks. It will mean early broods—started no later than the last of March or the first of April and marketed no later than June.

The farm flock-owner who hasn't the facilities to raise early chicks, or to produce a straight-run brood with full attention to the meat quality of his cockerels as well as to the egg laying ability of his pullets, will come out better by raising sexed pullets.

If his equipment isn't suitable for mid-winter breeding and he needs it for his pullets in April, May and June, he can still start a crop of fryers in September or early October to keep it in use and add to his income. If his equipment is weather-worthy, but small, he can brood his replacement pullets early and put a crop of meat birds through the house by June 15. (Experiment Station Record)

FUNK, E. M., and JAMES F. FORWARD. EFFECT OF WASHING SOILED EGGS ON HATCHABILITY. *Res. for Farm & Home, Ann. Rpt. of Mo., Bul. 535,* p. 76, December 1949.—During the 28-week period, January 21st to August 3rd, 6.3% of the 19,296 hatching eggs were classified as soiled. These 1215 eggs were cleaned by washing. The 18,081 clean, unwashed eggs hatched 69.9% of all eggs set as compared

to 69.1% for the soiled and washed eggs. This small difference in hatch was not considered significant.

In the spring hatching period, January 21st to April 27, a total of 769 soiled hatching eggs were washed. Their average hatch was 71.3%. The 9332 clean, unwashed eggs set during this 14-week period hatched 71.8%. (Experiment Station Record)

GREAVES, H. M. METHODS OF BROODING CHICKENS. *The Agricultural Gazette of New South Wales, Vol. LXI, Part 7,* July 1, 1950, page 378.—

COLD BROODING

Although cold brooding has been widely used in past years with success, it has lost favour to some extent, probably because of the amount of time that must be expended in ensuring that the chickens become quickly accustomed to going under the brooder, especially during the first three or four days.

Cold brooders usually consist of a canopy made of hessian packed with straw and with flannel strips suspended to the floor. The idea is to enable the chickens to generate their own warmth and the flannels prevent them from packing together. Cold brooders are now widely used as a "follow on" system for brooding three weeks old chickens previously kept in battery-brooders.

The cold-brooder depends for its success on the conservation of the natural animal heat of the chickens, but the appliance used must, at the same time, provide adequate ventilation.

The chickens keep warm by nestling among the flannel strips. (Experiment Station Record)

KEMPSTER, H. L. TIME OF HATCHING IN RELATION TO EGG PRODUCTION. *Res. for Farm & Home, Ann. Rpt. of Mo., Bul. 535,* p. 78, December 1949.—For fall and winter egg production under Missouri conditions the general purpose breeds, except possibly the New Hampshires, should be hatched in February or March and that Leghorns should be hatched in March or early April. (Experiment Station Record)

MARGOLF. P. H. TURKEYS GRAZE SAME PASTURE FOR FIVE SUCCESSIVE YEARS. *Science for the Farmer, 63 An. Rpt., Pennsylvania Bulletin 529,* July 1950, page 34.—Under good management 150 turkeys per acre may be grown successfully on an orchard grass pasture for five successive years.

The turkeys were 12 weeks of age when placed on these areas and were removed at 30 weeks. (Experiment Station Record)

SMITH, S. B., and W. H. WILEY. IS BROODER HOUSE INSULATION PROFITABLE? *Research for the Farmer, 62nd An. Report of Rhode Island, Contribution 763,* June 1950, page 11.—Birds in the non-insulated houses feather a little more rapidly and seem to gain a little more weight than those in the insulated houses. However, value of this extra weight is more than offset by the extra cost of heating the non-insulated house.

More condensed moisture formed on ceiling and walls of the non-insulated pens. There were no consistent differences in mortality between the 2 types of houses. (Experiment Station Record)

TAYLOR, W. RALPH. MIDWESTERNERS CAN GROW COMMERCIAL BROILERS. *U. S. Egg and Poultry Mag., 56:* 14, October 1950.—In each of the areas we visited, we found that commercial broiler production had developed and succeeded in much the same way and for very similar reasons. Briefly, these reasons were:

1. Farmers in those areas definitely needed additional income.
2. They were living on a poor type of soil which did not lend itself profitably to grain farming.
3. Some one individual or organization had come in with money to finance the program.

When we checked into the type of broiler chicks that growers in other sections were using with great success, we found that breeders

had developed some outstanding meat-type breeds. We hadn't kept up with these changes. Two years ago we were still offering our customers the old midwestern type of New Hampshires and White Rocks.

We lost no time changing our supply flocks over to some newer, established meat-type birds. Today we can supply large quantities of Nichols New Hampshires, Indiana River Crosses and Neel Barred Rocks—all superior broiler chicks.

During the two years we have been in the broiler business, we have run into many problems. They include such things as:

* The best type of housing and brooding to recommend
* Newcastle Disease control
* Epidemic tremors
* Coccidiosis control
* Marketing problems
* Landlord-tenant relationships. (Experiment Station Record)

BATTERY VERSUS FLOOR BROODING. *Agri. Res. in Texas,* 1947-49, p. 157.—Birds reared in batteries showed lower mortality and greater gains than those reared on dirt floors and cane litter. Battery-reared birds, however, showed poorer feathering, greater number of breast blisters and a greater tendency toward feather picking and cannibalism than those reared on litter. (Experiment Station Record)

ENCOURAGING THE PULLETS FOR FALL AND WINTER LAYING. *Texas Farming and Citriculture, XXVII:* 11, September 1950. (Experiment Station Record)

FLOOR SPACE. *Agri. Res. in Texas,* 1947-49, p. 157.—Tests at College Station and the Gonzales station showed that best growth, feathering and livability of broilers were obtained when approximately two-thirds to three-quarters of a square foot of floor space per bird was provided. (Experiment Station Record)

HATCHING DATE, METHOD OF MANAGEMENT, AFFECT EGG PRODUCTION. *Res. for N. Mex. Agri., 60th Ann. Rpt.,* 1949, p. 24. —Greater egg production during the first laying season was obtained from pullets hatched in March or April than from those hatched in May or June, and the pullets confined in laying cages produced more eggs than those in floor pens. (Experiment Station Record)

IMPROVED MANAGEMENT BRINGS BETTER FLOCKS. *Oregon's Agri. Prog. Through Res., 1950 Ann. Rpt., Sta. Bul. 491,* November 1950, p. 123.—Artificial lighting tests with toms showed that March and April hatched toms matured sexually between 24 and 28 weeks of age. May and June hatched toms required 32 to 36 weeks respectively to reach sexual maturity.

In comparison of brooding methods, poults brooded on wire floors in a room heated with hot air made better gains and had less mortality and better feathering than those started in radiant heat rooms.

The use of high efficiency type starting rations varying in protein content from 27 to 30 percent produced more rapid growth with greater efficiency than a 24 percent low energy ration to 8 weeks. No advantage was found, however, in using the high efficiency diet from 16 to 26 weeks of age.

Clean eggs hatched approximately 15 percent better than dirty eggs. (Experiment Station Record)

NEW PIONEER WOOD WOOL NEST PADS INCREASE EGG PROFITS. *Hatchery and Feed 24:* 49, October 1950.—The nesting material is wool-like in softness. Hens will not nervously tramp around in the nest because every spot is a good one to lay an egg.

Air freely circulates thorugh the pad. No contamination can result from material. Droppings and residue from soft shell eggs absorbed readily and solids are caught on the Kraft paper. Nests are clean, dry and sanitary.

Long strands of wood wool prevent eggs rolling together when more than one hen uses nest. (Experiment Station Record)

"OPEN-AIR" HOUSES PROVE SUCCESSFUL. *Oregon's Agri. Prog. Through Res., 1950 Ann. Rpt., Sta. Bul. 491,* November 1950, p. 119.—Despite the unusually severe cold weather of last winter, trials with "open-air" types of poultry housing again proved relatively successful. Tests were made with three types of shelters, including the original pole-type house, a lath house, and an open shed with an aluminum roof and individual laying cages. (Experiment Station Record)

RANGE REARING LOWERS COST. *Texas Farming and Citriculture, XXVII:* 11, September 1950.—In an investigation at the University of Vermont, $420 was saved in feed costs by rearing 2000 birds on range rather than in confinement. Poultrymen usually allow for feed 60 percent of their total cost of rearing replacement stock. The Vermont experiment showed that pullets reared to 24 weeks of age in complete confinement each consumed an average of 2.4 pounds more feed than similar birds on range. This means that 500 confined birds ate $51 more bought feed than did a like number of the other birds. This is good rent for an acre.

This investigation seems to indicate that range rearing has advantages over the confinement method. Range birds were grown to maturity on less feed, with a slightly higher feed efficiency. They were more uniform and firmer muscled at housing time. There was no significant difference in weight at the end of the 24-week period. The restricted method of feeding and good pasture undoubtedly accounted for feed savings. (Experiment Station Record)

SANITATION FOR TURKEYS. *Texas Farming and Citriculture, XXVII:* 11, Sept. 1950.—Dry litter is a simple precaution against losses from coccidiosis, a parasitic disease caused by an organism which requires warmth and moisture to survive.

Poults are born free from intestinal parasites, and that loss from these organisms can best be prevented by keeping the poults in frequently-cleaned brooder houses, not letting them have any contact with old chickens or turkeys, and keeping them on clean ground. (Experiment Station Record)

WIRE FLOORS VERSUS SAND LITTER. *Agri. Res. in Texas,* 1947-49, p. 157.—Broilers grown on wire floors showed lower mortality and slightly better gains than birds on sand litter. In most tests, however, birds reared on wire floors showed poorer feathering, more breast blisters and lower market grades than those raised on litter. (Expeiment Station Record)

GENERAL

BRANN, V. H. RAISING GEESE. *The Agricultural Gazette of New South Wales, Vol. LXI, Part 6,* June 1950, page 323. (Experiment Station Record)

DUDLEY, F. J., and D. R. READ. *(Rothamstead Expt. Sta., Eng.)* THE DESIGN OF EXPERIMENTS IN EGG PRODUCTION IN POULTRY. *Harper Adams Utility Poultry Jour. 34:* 65-82. 1949.—The exptl. poultry unit at the Inst. is described. Past expts. conducted in laying pens and in laying batteries are discussed in regard to design. Adequate replication is necessary to minimize positional effects. The expt. should be designed to provide at least 10 degrees of freedom for the estimate of error. The increased efficiency obtained from factorial expts. is discussed. The required differences in avg. egg production are tabulated for a pair of single treatments and for main effects with factorial design.—*T. B. Clark.* (Biological Abstracts)

GARDINER, JOHN L., and EVERETT E. WEHR. *(U. S. Dept. Agric., Beltsville, Md.)* SELECTING EXPERIMENTAL GROUPS OF CHICKS BY WEIGHT. *Proc. Helminthol. Soc. Washington 17:* 25-26. 1950. (Biological Abstracts)

GUHL, A. M. SOCIAL DOMINANCE AND RECEPTIVITY IN THE DOMESTIC FOWL. *Physiological Zoology, XXIII:* 361, October, 1950.—The influence of the habit of dominating associated with high rank in the social hierarchy upon receptivity in hens was determined experimentally. Relative dominance was altered by subdividing each of three flocks into three levels of the dominance orders. The rates at which hens in each level, as groups, crouched submissively for cocks were used as measures of receptivity. Hens composing the top level crouched less often than those of the middle or bottom levels, and those of the bottom level crouched at the highest rates. Subsequent to subflocking, the high-ranking hens crouched more frequently or approximately as often as those composing the lowest level. (Experiment Station Record)

HART, F. H. OPERATION OF AGITATED-AIR INCUBATORS. *Agri. Gazette New South Wales LXI (Part 9 & 10: 490 & 541, Sept. 1, & Oct. 2,* 1950, respectively.—(Experiment Station Record)

HICKS, A. F. JR. *(U. California, Berkeley.)* CROOKED TOES. POULTRY DEFECT MAY BE HEREDITARY NUTRITIONAL OR MANAGEMENTAL IN TYPE. *California Agri. 3:* 14-15. Illus. 1949.—Crooked toes in poultry may be caused by riboflavin deficiency, by competition for warmth and lack of traction on slick floors, or by hereditary defects. The nutritional type is accompanied by partial paralysis of the legs; the other types are limited to the toes. The hereditary type can be recognized by its occurrence in chicks before hatching and at hatching.—*G. W. Bohn.* (Biological Abstracts)

IYER, S. G., and S. NARAYANAN. USEFUL SPAN OF LIFE OF THE FOWL IN INDIA. *Indian Farming, 11:* 62, February 1950.—The average economic life of a hen in India, therefore, seems to be two years though individuals may lay well in the third year also rendering them most efficient breeders.

Despite the poor fertility combined with low egg production in the oldest stock, the egg size is definitely larger and the chickens hatched have been found to be far superior in respect of vigour and long utiltiy life, whereas the pullet progeny in the long run is likely to suffer from lowered vigour as well as shortened span of life unless proper selection is made. The cockerel for the breeding pens should come from the oldest hens in the flock. (Experiment Station Record)

McGINTY, JOHN. POULTRY NEEDS BETTER CREDIT. "CHICKEN PAPER" IS GOOD RISK. "Never lost a cent on 'chicken paper'," says Arkansas banker. Get the banker on your side for bigger business in the 50's. Loss ratio is small. *Hatchery and Feed 24:* 16, July 1950.—Bankers were astounded to learn that feeder loans to approximately $25 million had been made over a six year period with total bad-debt losses of $13,438—5/100 of one percent. And they were equally interested in the fact that broiler loans of more than $50 million over a 10-year period had resulted in a loss ratio of less than 1/100 of one percent. Profit figures on this volume of loans convinced the bankers that here was a source of business that was not only safe but extremely attractive. (Experiment Station Record)

READ, D. R. *(Rothamsted Exptl. Sta., Harpenden, Herts, Eng.)* A STUDY OF THE ACCURACY OF SIMPLE SAMPLING METHODS FOR THE ESTIMATION OF EGG PRODUCTION AND MEAN EGG WEIGHT. *Jour. Agric. Sci. 39:* 259-264. 1949.—This is a report on sampling methods of egg production and mean egg wt. in an attempt to find a sampling method that will predict an annual egg production. Standard errors were calculated and are tabulated in a form suitable for direct application by the practical poultry worker.—*Henry Dorsey.* (Biological Abstracts)

SCANLAN, JOHN J. HOOSIER HATCHERIES ASSOCIATE. *News for Farmer Cooperatives, 17:* 10, October 1950.—The small hatch-

ery cannot afford a well-trained, fulltime geneticist. Recent developments in the industry have shown that every hatchery needs greater access to improved strains, new breeds, crosses, and hybrids if it is to keep abreast of the times.

Aware of the developing dangerous plight of the small hatcherymen and breeders, in the spring of 1949 Dr. Martin wrote an open letter to all of the Indiana hatcherymen and poultry breeders.

Fifty letters were sent out and 45 hatcherymen and breeders attended the preliminary meeting on May 26, 1949.

With much enthusiasm and good leadership at the call of Dr. Martin, these Indiana poultrymen planned and promptly incorporated an agricultural cooperative.

The association started with 58 stockholding members. It is managed by a board of nine directors, two of them directors-at-large appointed each year by the director of the Purdue University Agricultural Experiment Station. The association has two-way dealings with its members. They furnish the foundation breeding stock and the association will supply the members with the new strains and crosses when developed. When the members pay their annual dues they receive in return the amount owed them for the eggs or chicks they furnished the association.

The association has adopted an equitable plan of distributing the chicks, hatching eggs, and breeding stock developed and released as follows:

1. Fifty-one percent is to be distributed equally among the members.
2. The remaining 49 percent is to be distributed to the members on the basis of the amount of stock owned and annual dues paid. (Experiment Station Record)

STEPHENSON, ALFRED B. SUPPLEMENTAL OXYGEN INCREASES THE HATCHABILITY OF EGGS AT HIGH ALTITUDES. Bringing Pressure Up to That Found at Sea Level Means Higher Profits to Hatchery Industry and Cheaper and Healthier Poults and Chicks to Poultry Producers. *Farm & Home Science by Utah, 11:* 65, December 1950.—Under the conditions at Utah State Agr. Coll. oxygen appeared to increase the hatchability of fertile turkey eggs on an average of one-half percent for each day it was given. . . . The extra oxygen does not appear to be of greater value during the peak embryonic mortality period than at other times.

From an economy of operation standpoint, oxygen gives its greatest returns during the first part of the incubation period. . . . Where a constant level of supplemental oxygen is maintained the extra oxygen is not of more benefit during the first than during the middle or latter portion of the incubation period.

A good rule to follow is to add supplemental oxygen as long as the cost of oxygen per day is less than the valuation of the poults from one-half percent of the fertile turkey eggs. (Experiment Station Record)

C-OF-T CONTESTS RESUME AS HAMPS WIN IN MARYLAND. *Poultry Industry,* July 1950, page 5.—Chicken-of-Tomorrow's 1950 state and regional competition began last month as the Truslow Poultry Farm, of Chestertown, swept three of the top five places in the Maryland state contest.

Truslow's New Hampshires, averaging 4.70 pounds alive and 4.32 pounds dressed at 12 weeks of age, won top honors, according to Dr. Morley A. Jull and Wade H. Rice of the University of Maryland, cochairmen of the state contest committee. Barred Crosses entered by the Truslow Farm won second and fourth places averaging, respectively, 4.57 and 4.23 pounds alive and 4.32 and 4.12 pounds dressed.

The Junior Chicken-of-Tomorrow Contest was won by William B. Dail, of Cambridge, a 4-H Club member and a Future Farmer. Young Dail's New Hampshires reached 5.33 pounds alive and dressed out to a 4.80 pound average. (Experiment Station Record)

DISINFECTION OF HATCHING EGGS. *Agri. Res. in Texas, 1947-49,* p. 156.—Either liquor cresois or one of several of the quarternary am-

monium compounds gave good disinfecting results and increased hatchability slightly, especially if the eggs were dirty when dipped in the disinfectant. (Experiment Station Record)

LICE AND MITE CONTROL. *Agri. Res. in Texas*, 1947-49, p. 156. —Effective control was obtained by the use of a spray containing a mixture of 1 percent lindane and 2 percent DDT. This mixture can be applied as a roost paint shortly before the birds go to roost at night, or it may be sprayed on the roosts, nests, litter and on and around the birds. (Experiment Station Record)

POULTRY. *Science and the Land, 1948-49 An. Rpt. of New Jersey*, pages 80-88.—What Income can be Expected from Poultry Farming?

For the Poultry year ending August 31, 1947, a survey of 40 specialized poultry farms in New Jersey showed an average labor income of $1,910. Labor income is the amount which the operator has left for his work after all expenses, including interest on the investment, have been deducted from gross receipts. To this income must be added the poultry and eggs consumed by the farm owner and his family. These farms had an average of 2,456 laying hens. The average flock at the beginning of the year was about 3,000 layers. The operator's labor income varies from year to year, largely because of changing relationships in prices of feed and eggs. It is estimated, on the basis of the average farm in this survey, that the labor income in the last 5 years varied from a low of $408 per operator in 1947-48 to a high of $3,078 in 1948-49.—*John W. Carncross.*

What is the Annual Cost of Keeping a hen in the Laying Flock?

A survey of 36 specialized poultry farms in New Jersey for the poultry year ending August 31, 1947 showed an average cost of $7.52 for each layer, or 55 cents for a dozen eggs produced. The important items of cost were: feed, $4.43; labor, $1.46; depreciation or replacement of the layer, $.92; and use of buildings, $.33; all other costs, $.38 for each layer. The total average cost of keeping a layer for 1 year is estimated to have varied in the last 5 years from a low of $6.06 in 1944-45 to a high of $8.79 in 1947-48.—*John W. Carncross.*

On the Basis of Routine Diagnosis, What Diseases Would Appear to be Assuming Major Importance?

Of the many diseases diagnosed, three are conspicuous. One of these is variously called "blue comb" or "pullet disease" by virtue of the cyanotic comb on its occurrence in recently housed pullets. The disease is most common during hot humid weather, and the use of new wheat favors its appearance. The cause of the disease is not known, and therefore preventive and remedial measures are purely empirical. Bronchitis is the second disease that is acquiring importance because of its sudden increase last year. The cause is a virus, and, if necessary, a crude but effective method of immunization can be employed. . . . The third important disease is blackhead in chickens. It usually appears following vaccination with fowl pox vaccine.—*Fred R. Beaudette.*

What are the Signs of Amino Acid Deficiencies in Growing Chicks?

Defiiciencies of all 10 essential amino acids were produced by feeding purified diets supplemented with amino acids. In every case the rate of growth was markedly decreased, and in all severe deficiencies the birds lost weight and died in a relatively short time. Examination of the birds, however, showed no specific changes by which it might be possible to recognize any of the deficiencies.—*Walter C. Russell, M. Wight Taylor,* and *Irwin W. Lane.*

Can Turkey Broilers be a Profitable Product?

Turkey growers, especially those in a position to handle retail trade, can sell turkey broilers at a good profit. This year, at 12 weeks of age, our Buff broilers averaged 4.93 pounds and had consumed 14.05 pounds of feed per bird at a cost of only 70 cents.—*John J. Dowling Jr.* (Experiment Station Record)

Note:

The Experiment Station Record, published by the Office of Experiment Stations, United States Department of Agriculture, was discontinued as a publication several years ago. References to "Experiment Station Record" in some of the items of this abstract material, therefore, refer not to the publication of this name but to the records kept by the Office of Experiment Stations.

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The World's Poultry Science Association has entered into an agreement with University Microfilms, Ann Arbor, Michigan, U.S.A. to make available the World's Poultry Science Journal in microfilm form.

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Under the plan the library keeps the printed issues unbound for circulation. When the paper copies begin to wear out or are not called for frequently they are disposed of and the microfilm is substituted.

Sales are restricted to those subscribing to the paper edition and the film copy is only distributed at the end of the volume year.

The microfilm is in the form of positive microfilm and is furnished on metal reels, suitably labeled. Inquiries concerning purchase should be directed to University Microfilms, 313 N. First Street, Ann Arbor, Michigan, U.S.A.

IMPORTANT NOTICES

SUBSCRIPTIONS FOR 1951 NOW DUE

According to Article XI of the Constitution "the annual subscriptions are payable in advance on January 1st in each year. In case of failure to pay the subscription before June 1st the member's name shall be removed from the mailing list of the Journal until renewal of his subscription."

Please remit $3.00 or one Pound to the Treasurer-Assis-

WORLD'S POULTRY SCIENCE ASSOCIATION

Financial Statement

Jan. 1, 1950 to Dec. 31, 1950

	Dr. Heuser	Major Macdougall
Balance Jan. 1, 1950	$ 142.73	£1126-9-3
Receipts		
Memberships	3,138.39	558-0-0
Advertising (Journal)	2,194.46	
Danish Congress Committee	578.00	
Danish Agricultural Council	578.00	
Subscriptions (Journal)	274.50	
Transfer from Major Macdougall	70.00	
Back volumes (Journal)	57.00	
Congress Reports	42.46	
Reprints (Journal)	7.55	
Sundry	——	9-6-5
Suspense Account	——	2-10-5
TOTAL	$7,083.09	£1696-6-1
Expenditures		
Printing (Journal)	$2,415.11	
Editor (Journal)	400.00	
Translations (Journal)	11.50	
Postage	308.25	13-8-1
Biological Abstracts	28.00	
Clerical	600.00	
Supplies (brochure, letterheads, envelopes, stencils, etc.)	399.38	6-12-11
Subscriptions to Poultry Science	10.00	
President's expenses	68.10	
Transfer to Savings Account	2,000.00	
Travel	——	42-11-1
Administration	——	30- 0-0
Contribution to U.K. Branch	——	76-10-0
Transfer to Treasurer	——	25- 0-0
TOTAL	$6,240.34	£194-2-1
Balance, Jan. 1, 1951	$ 842.75	£1502-4-0
Balance, Savings Account, Jan. 1, 1951	$4,423.22	

tant Secretary, Dr. Gustave F. Heuser, Rice Hall, Cornell University, Ithaca N. Y., U.S.A., or to Secretary-Assistant Treasurer, Major Ian Macdougall, 5 Chandos St., London W.I., England.

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NOMINATION OF OFFICERS

Attention is directed to Article VI of the Constitution relating to "Officers and Council," with particular reference to nominations for the same.

(1) The officers of the Association shall consist of a President, three Vice-Presidents or more, Honorary Past Officers, a Secretary, and a Treasurer.

(2) The affairs of the Association shall be managed by its Officers and a Council composed of such number of individual members of the Association from each country represented in the Association, having five or more members, according to the following schedule; five to twenty-five members, one member of Council; twenty-six to fifty members, two members of Council; for each fifty members over the first fifty members, one additional member of Council as soon as one half of a group of fifty has been reached. No country shall have more than 10 members of Council. (Where a country now has more members of Council than it will get according to this revised Constitution, the full number will serve until the next election.)

(3) The term of office as President, Vice-Presidents, Secretary and Treasurer shall be three years. Each Member of the Council shall be elected for six years. The elections shall be held at the Triennial Meetings of the Association.

(4) For the election of President, Vice-Presidents, Secretary and Treasurer a three-fourths vote of the Council shall be required, and such election shall be at the Triennial Meetings. Nominations for these offices may be made in writing by any Member of the Association or by the Council.

(5) One-half of the Members of the Council shall be elected every three years at the Triennial Meetings. Nominations for the Council may be made to the Secretary in writing by any Patron or Affiliated Body or Branch Organization or Member of the Association of the country concerned. If no nominations are received from such Members, nominations may be made by any Member of the Council. A majority vote of the Council shall be required for election.

(6) In all votes of the Council the requisite majorities specified in the foregoing clauses shall be construed as of those voting.

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(Received since last issue)

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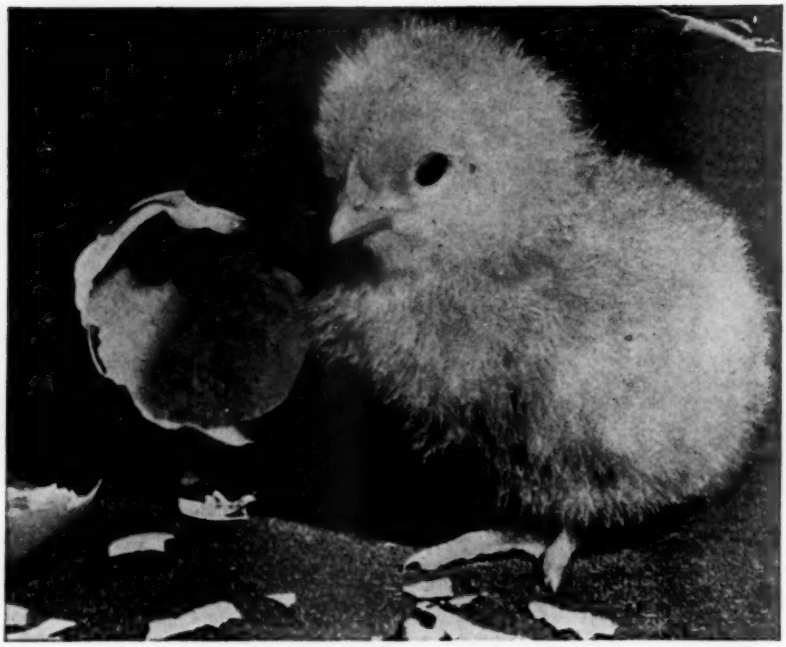

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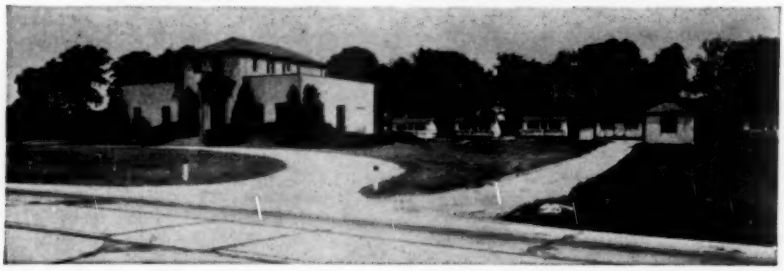

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Coccidiosis Losses Are Avoided • Greater Feed Efficiency Is Obtained

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MEGASUL-25% Nitrophenide *Lederle* is a low-priced drug for prevention of outbreaks of cecal and intestinal*** coccidiosis by continuous low-level feeding (a 0.0125% concentration of the drug—1 lb. of MEGASUL-25% to the ton to 0.025% concentration of the drug—2 lbs. of MEGASUL-25% to the ton) in poultry feeds. If an outbreak of coccidiosis is to be controlled, a feed containing a higher level of MEGASUL (0.05% of the drug—4 lbs. of MEGASUL-25% to the ton) is fed intermittently for a few days.

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***For use in Poultry Feeds to prevent and to control outbreaks of cecal and necatrix coccidiosis.

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Baciferm-5 is Commercial Solvents' antibiotic feed supplement containing bacitracin, a polypeptide antibiotic of *high molecular weight*. The large size of its molecule *prevents significant absorption* from the intestinal tract at the levels used in feeds. It is not readily destroyed by enzymes. Baciferm-5 is a dry, free-flowing product which is easy to mix and does not dust. It is light brown in color and has a pleasant odor.

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It has proven effective in stimulating the growth of poultry and swine and increasing feed efficiency. For most finished feeds the recommended level of Baciferm-5 is 2 lbs. per ton.

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It has proven stable in a wide variety of formulations and is compatible with sulfaquinoxaline, nitrofurazone, and nitrophenide.

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An efficient antibiotic feed supplement at an economical price.

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The tough, sharp, extra grinding surfaces on STONEMO do just that: grind feed—make feed nutrients available so that birds can use them more effectively to produce eggs.

STONEMO is hard, insoluble granite. It will not dissolve in the bird's gizzard—will not upset mineral balance of rations.

Safeguard your investment in high capacity layers. Increase egg production per pound of feed and save feed costs! Include STONEMO in your feeding program. Get it from your feed or poultry supply dealer.

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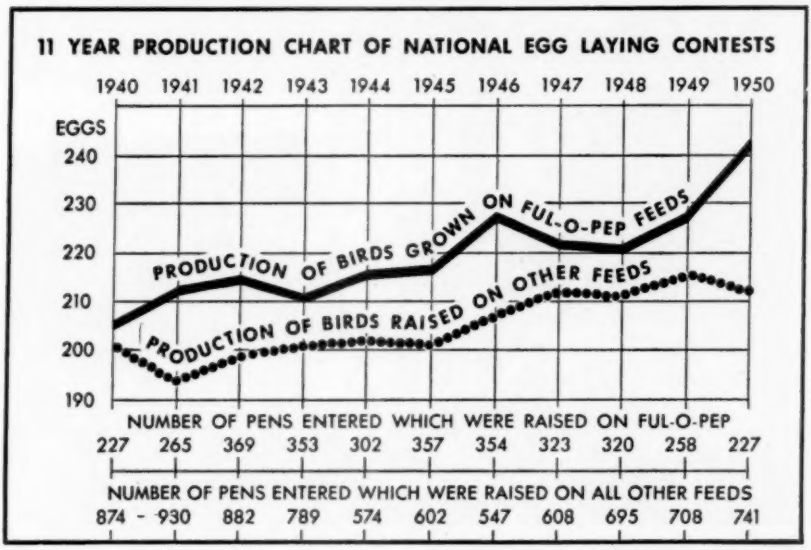
11 YEAR PRODUCTION CHART OF NATIONAL EGG LAYING CONTESTS
1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950
EGGS
240
230
220
210
200
190
PRODUCTION OF BIRDS GROWN ON FUL-O-PEP FEEDS
PRODUCTION OF BIRDS RAISED ON OTHER FEEDS
NUMBER OF PENS ENTERED WHICH WERE RAISED ON FUL-O-PEP
227 265 369 353 302 357 354 323 320 258 227
NUMBER OF PENS ENTERED WHICH WERE RAISED ON ALL OTHER FEEDS
874 - 930 882 789 574 602 547 608 695 708 741

Birds grown on Ful-O-Pep average laying the equivalent of 14½ MORE 2-OZ. EGGS EACH

INFORMATION PRESENTED in the above chart is excellent proof that Ful-O-Pep grows America's Best Pullets.

YOU WILL NOTE that for the past 11 years in these official contests 43,615 Ful-O-Pep raised birds averaged laying the equivalent of 14½ more 2-oz. eggs each than the average of 103,350 birds grown on all other feeds. And during this time over half of the winning pens and hens were grown on Ful-O-Pep.

IN THE 1950 CONTESTS Ful-O-Pep raised birds averaged laying the equivalent of 29 more 2-oz. eggs each than birds grown on all other brands of feed. Ful-O-Pep feeders also won high pen in 10 and high hen in 7 of the 15 official tests.

CERTAINLY THIS SUPERIOR egg production is outstanding proof that Ful-O-Pep Research is building better feeds. Best of all, the Ful-O-Pep Restricted Feeding Plan saves poultrymen up to 30% feed cost for growing pullets . . . the kind of birds that produce well and stand up under the strain of heavy, continuous laying.

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. . . makers of dependable feeds for over 60 years

SULFAQUINOXALINE

Prevents and Controls Coccidiosis Outbreaks

Proved in Hundreds of Millions of Birds

During the past few years, Sulfaquinoxaline has saved millions of birds from premature death or stunting due to coccidiosis. Aided by this effective agent, poultry growers have been able to raise production standards to new high levels of quality and quantity.

ADDED TO POULTRY FEEDS OR DRINKING WATER, SULFAQUINOXALINE AFFORDS:

PREVENTION AND CONTROL of outbreaks of cecal and intestinal coccidiosis of chickens and coccidiosis of turkeys; checks immediate mortality in acute fowl cholera of chickens, turkeys, and pheasants.

REDUCED MORTALITY. Sulfaquinoxaline has reduced coccidiosis deaths—from the previously considered "normal" rate of ten to twenty per cent—to less than two per cent.

BETTER FEED EFFICIENCY. Published data show that Sulfaquinoxaline-fed broilers weigh more, and eat less feed per pound of gain, than untreated birds.

BETTER MARKET QUALITY. Flocks receiving Sulfaquinoxaline maintain better shank color, and complete feathering at an earlier age. Sulfaquinoxaline reduces the stunting which often follows coccidiosis.

SAFETY. Safe also for replacement pullets—no adverse effect on egg production, fertility, or hatchability. The safety margin of the drug exceeds many times the recommended therapeutic dosage.

CONSISTENT PERFORMANCE. No severe outbreaks of cecal or intestinal coccidiosis in 86 successive broiler flocks. There has been no evidence that the parasites become resistant to Sulfaquinoxaline.

VERSATILITY. Effective the year-round under a wide variety of climatic conditions.

PROTECTION. Sulfaquinoxaline helps birds to develop an immunity to the types of coccidia to which they are exposed.

Numerous published *reports by outstanding poultry authorities* attest to the effectiveness of Sulfaquinoxaline. Annotated bibliography and detailed literature on the use of Sulfaquinoxaline in feed or drinking water will be sent on request.

Sulfaquinoxaline products are supplied, under the labels of various manufacturers, in the form of feed mixtures, premixes, solutions, tablets, or soluble powder.

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